

UNIVERSAL

MODEL

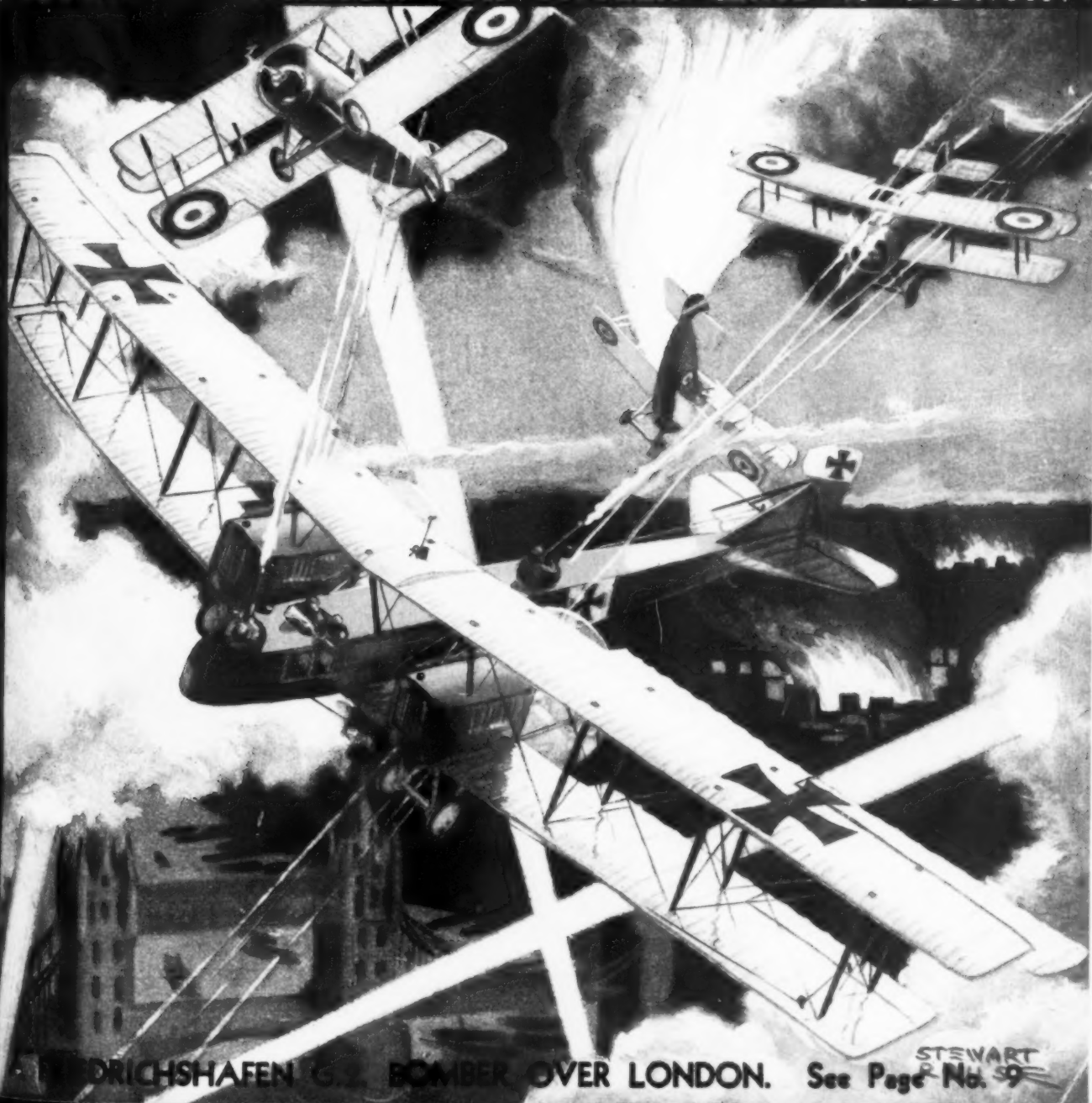
AIRPLANE

NEWS

NOV.
1932.

15¢

COURSE IN AVIATION FOR FIFTEEN CENTS A MONTH!"



DRICHSHAFEN

BOMBER OVER LONDON.

See Page No. 9

STEWART

Low Prices and High Quality are Responsible for the Great Demand for

WOBURN KITS and SUPPLIES

COVERING MATERIALS

Japanese Silk Tissue Paper.
Grade A: Size 20 1/2" x 21 1/2"
Colors: Red, white, blue, green, orange, olive brown.
2 sheets, 5c; 2 1/2 doz. 30c.
Grade B: Size 20" x 30"
Colors: White, red and green only.
3 sheets, 5c; 18 doz. 20c.
Black English Parachute. Size 20" x 30". Color: Black only. 5c sheet; 6 sheets 28c.

MICROFILM
Several times stronger than Superfine tissue, and aluminum leaf; also lighter and easier to handle. Per sheet 5c. Approximate size 8" x 12".

ALUMINUM MATERIALS

TUBING	
1/10 O. D.	2 ft. 11c
1/8 O. D.	1 ft. 7c
3/16 O. D.	1 ft. 9c
COWLINGS	
Open Face or N.A.C.A. Type	
1 1/2" diam.	22c
1 3/4" diam.	25c
2" diam.	25c
2 1/2" diam.	30c
3" diam.	35c
3 1/2" diam.	45c
4" diam.	60c
DRAG RINGS	
1 1/2" diam.	20c
1 3/4" diam.	22c
2" diam.	25c
2 1/2" diam.	25c
3" diam.	30c
3 1/2" diam.	35c
4" diam.	40c
SHEET	
.008	sq. ft. 12c
.010	sq. ft. 14c
.012	sq. ft. 16c
.013	sq. ft. 19c
PRIME MOVERS	
Enable you to use 2, 3 or 6 elastic motors in one plane. Complete, ready to attach to any plane.	
For 2 elastics, ea.	\$.10
For 3 elastics, ea.	.20
For 6 elastics, ea.	1.50

CELLULOID ITEMS

Celluloid sheet for windows on cabin planes, windshields, etc. Size, 5x15", 2 for 1c, 12 for 5c.

WHEELS
Colors: Red, white, blue, black, green, pink, purple, yellow.
1 1/2" diam. pair 4c
1 3/4" diam. pair 4c
2" diam. pair 8c
2 1/2" diam. pair 12c
3 1/2" diam. pair 27c

PANTS, black only
Streamliners for wheels.
For 3 1/2" or 1 1/2" wheel, pr. 15c
For 1 1/2" or 1 1/2" wheel, pr. 25c

DUMMY MOTORS, black only
9 cylinder double impression
1 1/2" diam. 15c
2" diam. 20c
2 1/2" diam. 27c

COWLINGS, black only
2 1/2" diam. ea. 20c

Special Propeller Carving Knives

The best obtainable for carving propellers, made from tempered steel, and take a keen edge. They have a point that makes it easy to get a hollow or cup-like shape in the blade of the propeller, thereby giving it a better pull or grip on the air. This increases efficiency, speed, distance and duration. Price each 50c.

IMPORTANT ORDERING INSTRUCTIONS

10% packing and postage charge must accompany all orders. 10c extra to above charges on orders for less than 50c worth of balsa wood. No order under 25c accepted. No stamps or C.O.D.'s. Orders west of the Mississippi 5c extra. Foreign orders 10c extra to above charges. Orders shipped same day received. Send for Free Price List containing World's Lowest Prices on Model Supplies. Dealers and clubs, write for discounts.

15" Flying Scale Models

These Kits are complete in every detail and the Models make wonderful flights.

66c P.P.
Lockheed Vega;
Fokker Triplane;
Hawk P.C.E.;
Ansaldo;
P.Z.L. Pursuit;
Albatross D-III;
Nieuport Baby Scout; D.H. Tiger Moth; Gloster IV Seaplane; Pfalz Pursuit; Bernard Pursuit;
Fokker D-VIII; Supermarine Racer; Gee-Bee Racer;
Laird Super Solution; Lockheed Orion; Bellanca Skyrocket; Curtiss Heli Diver.



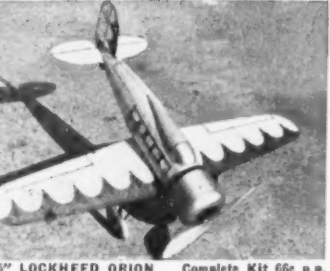
15" FOKKER D-VIII Complete Kit 66c p.p.



15" HELL DIVER Complete Kit 66c p.p.



15" HAWK P.C.E. Complete Kit 66c p.p.



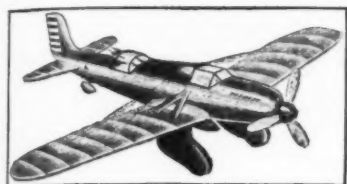
15" LOCKHEED ORION Complete Kit 66c p.p.

2 ft. STINSON DETROITER. This model has flown over 1000 feet. A winner for endurance and stability. **75c p.p.**
Plans for 2 ft. Stinson Detroit, 20c each; Plans for any 15 inch model, 10c each, 3 for 25c, 6 for 45c.
HEATH BABY BULLET, complete kit for 7 1/2" model. Will fly 100 feet if plans are followed. **15c p.p.**
Enough materials for 2 models, 20c p.p.

NEW "GLOISH" BALSA

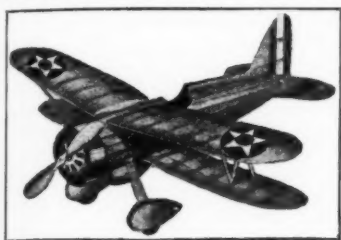
24" STRIPS				24" PLANKS			
1 1/2	x 1 1/2	9 for	2c	1	x 2	1 for	15c
1 1/6	x 1 1/2	9 for	2c	1 1/2	x 2	1 for	18c
1 1/6	x 3/2	9 for	2c	2	x 2	1 for	25c
1 1/6	x 1 1/2	9 for	2c	2 1/2	x 2	1 for	25c
1 1/6	x 3/2	9 for	1c	3	x 2	1 for	25c
1 1/6	x 1 1/2	9 for	1c	3 1/2	x 2	1 for	25c
3 3/2	x 3/2	9 for	3c	4	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	4 1/2	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	5	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	5 1/2	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	6	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	6 1/2	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	7	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	7 1/2	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	8	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	8 1/2	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	9	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	9 1/2	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	10	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	10 1/2	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	11	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	11 1/2	x 2	1 for	25c
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1 1/6	x 3/2	9 for	3c	26	x 2	1 for	25c
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1 1/6	x 3/2	9 for	3c	38	x 2	1 for	25c
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1 1/6	x 3/2	9 for	3c	39	x 2	1 for	25c
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1 1/6	x 3/2	9 for	3c	91	x 2	1 for	25c
1 1/6	x 3/2	9 for	3c	91 1/2	x 2		

Are you building the "Big 4"?



If you want beautiful, accurate, easily-constructed and perfect-flying Models of the popular ships of the day, here they are! Thousands of Builders are getting real sport and wonderful performances out of the "Big 4" of Modeldom . . . the IDEAL-Designed 18-in. Wing Span Flying Models . . .

**Curtiss A-8 Attack Plane • S-6-B Supermarine
Curtiss F9C-2 "Akron" Fighter • Boeing XP-936 Pursuit**



Every essential detail of these present-day ships is copied in these Ideal-Designed Models, and materials furnished in the Kits so you can reproduce them perfectly. As usual, Ideal-Designed Kits make building easier because more of the time-taking work is done for you. Design patterns for all flat parts are printed on balsa ready to cut out; all wire parts are ready to use; new machine-cut balsa props are furnished on all except the A-8; straight strips for spars, longerons, etc., are cut to size and length; liberal quantities of cement, model dope, rubber, silk tissue, reed and other supplies come in each Kit. Each Kit also contains a Full Size Plan showing all details, with intricate parts shown enlarged and fully explained. You can build easier with Ideal-Designed Kits! Select the Models you want now and send along your order!

\$1.

Complete 18-in. Construction Kits . . .

POSTAGE EXTRA:—If you order one Kit, send 15 cents extra for postage (\$1.15 in all). If you order two Kits, send 25 cents extra. If you order three or four Kits at one time, we will pay the transportation charges.

E A C H

PLUS POSTAGE



**6-in. Carved
Miniature
Replica Models**

Solid Balsa, Hand-Carved duplicates of famous Airplanes; perfect copies in every detail, colored and decorated like the originals. Just the thing for exhibitions, decorations and presents to friends. Each comes in complete Kit with instructions. Select from these twenty (20) different Ships, and order your Kits now so you can make them for Christmas . . .

Curtiss Fledgling
Pittsair Autogiro
Spad
Laird

S. E. 5
Go-Boe
Hawport
Supermarine
Hell Diver
Lockheed Vega

Hawk PSE
DeHavilland
Vought Corsair
Boeing Fighter
Howard Racer
Albatross
Fokker Triplane
"Akron" Fighter
Pfalz
Sopwith Camel

Select your Kits from the above list and send your order now . . .

2 Kits for 60c

(Postage 10c Extra)

6 Kits for \$1.50

(Postage 25c Extra)

Here's
**Triple Value
for one price!**

**Three 15-in.
Flying Models for \$1.50**

Postage
15c Extra

These Combination Kits offer Big Value; each Kit contains all materials and full size Plans for three 15-inch Flying Models. Full fuselage type with build-up wings. Three different Kits to select from:

KIT No. 1
Travelair
Army Falcon
Boeing Fighter

KIT No. 2
Fokker D-VII
Lockheed Vega
Waco

KIT No. 3
Spad
Vought Corsair
Lockheed Sirius

Each Kit \$1.50, plus 15c postage
Be sure to mention which Kit you want

Pick yours now and get started! You get three 15-inch Flying Models for what one would cost if packed separately. Each one a neat job, easy to construct and a perfect flyer.

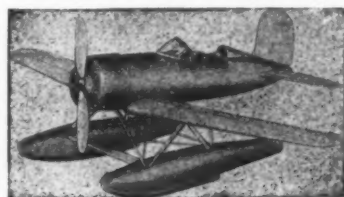
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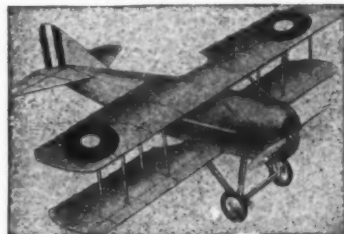
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UNIVERSAL



Vol. VII

No. 5

Edited by Charles Hampson Grant

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In Our Next Issue

The Airplane Catapult

Lieut. (jg.) H. B. Miller gives us the interesting points about the development of the catapulting of airplanes from battleships in—Human Cannonballs. Also plans for building a model catapult.

Heath Parasol and Howard's "Ike"

Jo Howell crashes through with a neat set of plans and instructions to build a flying scale model of the new Heath Parasol as well as plans to build a solid scale model of Ben Howard's "Ike."

Learning to Soar in Germany, by Bernard Flinch, gives a graphic description of how the author learned to master the tricky wind currents of the Rhön Mountains. There is plenty for the young aviator to learn from this interesting article.

The regular course, *The Aerodynamic Design of the Model Plane*, by Charles Hampson Grant, continues to unfold the mystery of stability.

Other interesting features, Air Ways, Three View Drawings of noted planes by Stockton Ferris, Jr., and a War Ace Story by F. Conde Ott, make our Christmas number all that Santa Claus may desire for his many friends.

Order your copy of UNIVERSAL MODEL AIRPLANE NEWS from your newsdealer now, or send \$1.65 for your year's subscription to this office, 125 West 45th Street, New York City.

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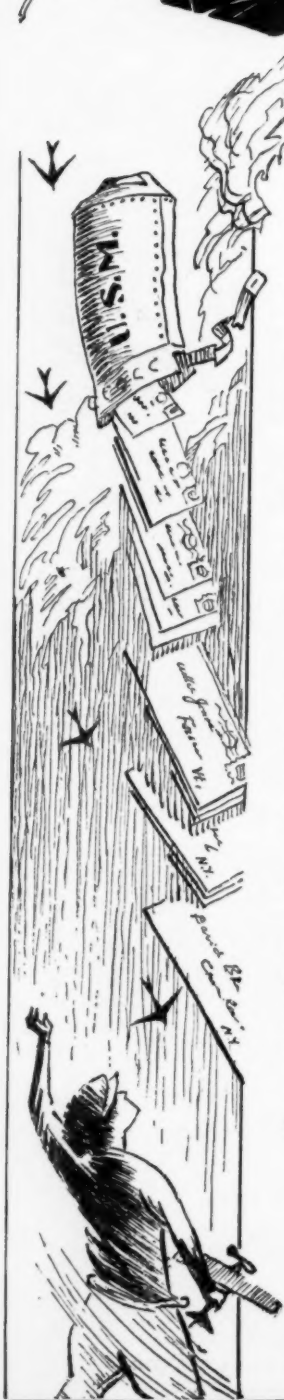
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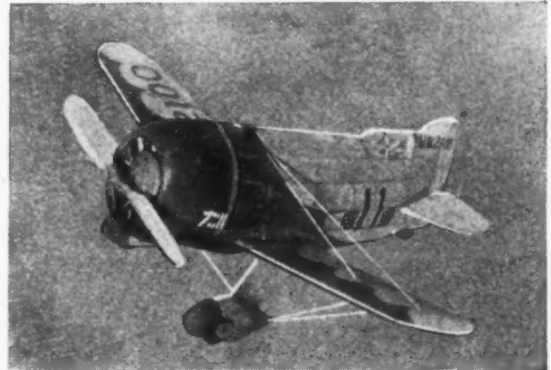
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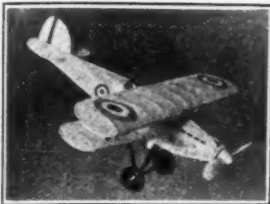
Here it is —> NEW GEE-BEE SPORTSTER

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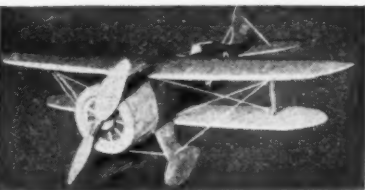
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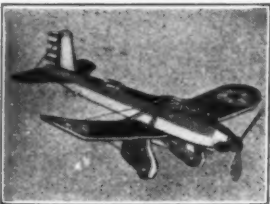
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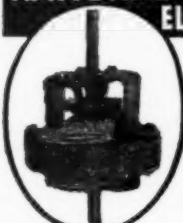


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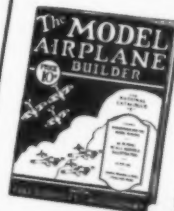
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Flying the Front for the Navy



One of the Nieuport No. 28s used by Ingalls in his many air battles

AT eighteen he was in a classroom at Yale. At nineteen he was behind the machine gun of a tricky fighting plane as Flight Commander of a picked detail. At twenty he was awarded the D. S. C. by the King of England.

This, in brief, is the dramatic war-time record of David Sinton Ingalls, late Assistant Secretary of the Navy for Aviation. As a member of the famous Northern Bombing Group, naval aviators who had left the sea to fly on the Western Front, Ingalls demonstrated amazing skill as a flyer, a leader, and a fighter. He had a talent for narrow squeaks, time after time bringing his plane back from some encounter with German airmen so riddled and torn that only a miracle of luck could have supported it in the air long enough to make a safe landing.

The story of Ingalls rightfully begins before our entrance into the World War. It begins with a group of boys in college whose practical patriotism proved wiser than that of their elders in the hour of the country's dire need. In 1915, a number of seniors and juniors at Yale led by F. Trubee Davison, later to become Assistant Secretary of War for Aviation, turned their attention from football and hockey to a far more grim and thrilling game.

Trubee Davison had spent the spring and summer of that year working in the American Ambulance Field Service. He met many of the flyers of the gallant Lafayette Escadrille—Norman Prince, Kiffin Rockwell, Victor Chapman. Names to make any American proud. He talked with these young flyers, heard first-hand accounts of hazards, escapes, and the methods of an air service in the war.

Returning to this country, he realized how unprepared America was to take part in aerial warfare. There were few planes, even in the services, and almost no pilots. The Navy, at that time, had just thirty-eight qualified aviators. Davison talked with his classmates, injecting into them some of his enthusiasm for this splendid service. He made them see that no matter how skeptical grey-haired authorities of the country might be, the youth of the nation must be prepared to spring into the cockpits of hundreds of planes if that day should come when we must take part in the war. Eventually, he and his friends

How David Sinton Ingalls Battled His Way to Fame Over the Western Front

Lieut. (jg) H. B. Miller

organized the First Yale Unit, and set about to train themselves as flyers. They were the "Minute Men" of aviation and did this country and the Navy a splendid service.

Ingalls, younger than this group, all of whom were juniors or seniors, took a deep interest in the early struggles of the Unit to obtain backing and money to carry on their flight course. Eventually, he joined the Third Yale Unit which was trained under the auspices of the Navy.

This unit went across early in 1918 arriving in Northern France at a time when the flying manpower of the Allies was at a low ebb. Ingalls, in common with his fellow flyers, was eager to get into the fray. They had spent months of arduous preparation to fly under war-time conditions. They expected to chase Germans out of the sky the day after disembarking. Their disappointment was keen, upon arriving at their base, to find that there were no planes for them to fly.

It was perfectly natural that Ingalls and many other flyers would drift over to the French or English pursuit squadrons, adjoining the base of the Unit. Here they would watch the planes come in, listening avidly to the first-hand accounts of dog-fights over the front.

Friendships were formed between the French and English pilots and the newly arrived Americans. The Allied airmen lent their tricky little ships to the Americans. Imagine the sensations of these youngsters who had never flown single-seaters before; who had never known anything but the slow and comparatively clumsy training planes! Though it is not in the records, it is highly probable that some of these flights, surreptitiously, led

(Continued on page 39)



David Sinton Ingalls, World War Air Fighter and late Assistant Secretary of the Navy for Aviation.



A Fokker D II, one of the greatest German fighting ships that Ingalls had to face.

How Well Do You Know Your Airplanes?

What Are the Names of the Airplanes Silhouetted on this Page?

The following awards will be paid by UNIVERSAL MODEL AIRPLANE NEWS to the persons whose letters, in the opinions of the judges, show the greatest evidence of accuracy, neatness and attention to detail. The winners will be judged by Mr. Charles H. Grant, Editor of UNIVERSAL MODEL AIRPLANE NEWS, and Mr. Stockton Ferris, Jr.

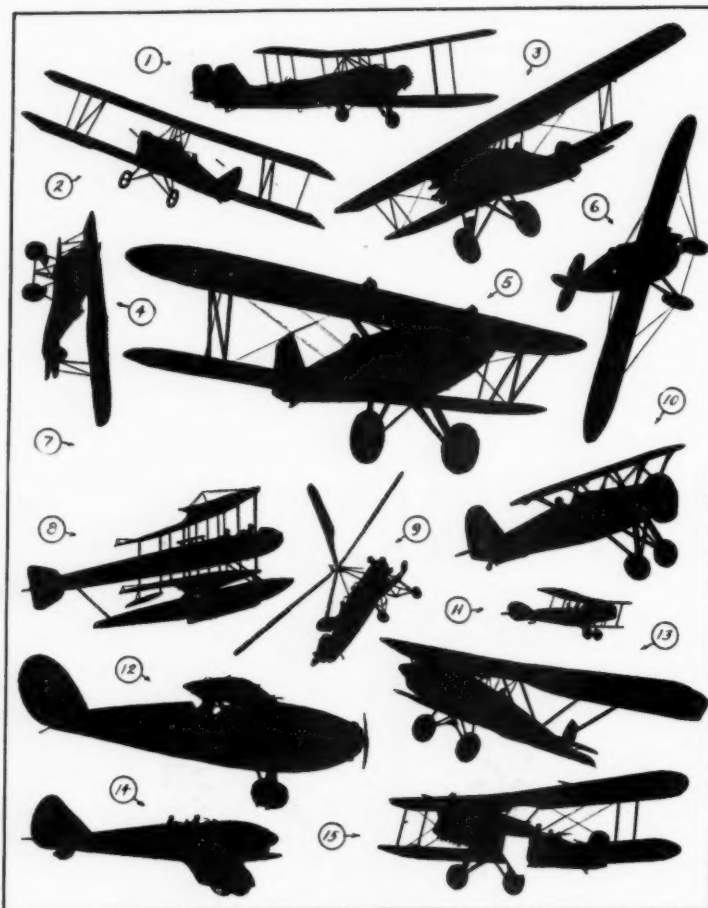
Award for First Place, \$5.00; award for Second Place, \$3.00; award for Third Place, \$2.00.

In the event of two or more per-

sons being tied for the first, second or third places, both persons will be paid the award.

All entries to be eligible for these awards, must be received not later than December 1st, 1932. Address all answers to Silhouette Award, care UNIVERSAL MODEL AIRPLANE NEWS, 125 West 45th Street, New York City.

Get busy, sharpen your wits, and see how good you are. This contest will increase your aviation knowledge, which will be a constant source of pleasure to you.



Here Are the Answers to the September Contest

I AM afraid that we owe an apology to our readers for allowing them so little time in which to prepare their answers to the September Silhouette Contest. Due to circumstances which we could not avoid the magazine did not come out until very late. However, some very ambitious and intelligent young men managed to get some very excellent answers into our office before the closing date of the contest. They are to be commended for turning in such excellent copy in so short a time.

There were more one hundred per cent answers to the September contest than for any previous one. The winners, therefore, have been judged on the basis of their neatness and the amount of information they have supplied about each ship, provided all the answers were correct in the first place.

We do not wish to keep you in suspense for too great a time, so here are the correct answers for September.

1. Curtiss Navy Fighter F-9.
2. S.E.5 A (wartime).
3. Solar MS-1.
4. Waco "F" straight wing.
5. Curtiss Carrier Pigeon II.
6. Fokker D.VIII (wartime).

7. Boeing P12-B.
8. Curtiss Hawk P-6.
9. Laird Super Solution.
10. Pitcairn Mailwing PA-7.
11. Vought O2U seaplane.
12. Lockheed Air Express.
13. Fairchild K.R 21 or 21B.
14. Arrow Sport Trainer.

Now, for the names of the winners. All of these boys named every ship correctly as well as giving an unbelievable amount of information concerning them.

The winner of the first award is Kenneth Reeves of 655 West 190th Street, New York City. This entry was extremely neat. Also, he took great care in giving every bit of information that it was possible to give.

The second award goes to Ike L. Kibbe of 1105 San Jacinto Street, Austin, Texas.

The third award goes to Robert C. Morrison, Mercersburg Academy, Mercersburg, Pa.

We wish to give special mention to Ronald J. Small of 601 West 173rd Street, New York City; Wendell Westerlund of 3949 Waveland Avenue, Chicago, Illinois; and Joseph Gigante of 57 East (Continued on page 42)

Build the Friedrichshafen G II, War-Time Bomber

Complete Instructions and Plans of the Famous German Bomber That Often Bombed London

By Robert V. Smith

THE flying model to be built this month is the Friedrichshafen G II, a German war-time ship used for long distance bombing flights. This model is what may be called the little brother of the plane which appeared on the cover of the October 1931 issue of Universal Model Airplane News, the Friedrichshafen G III.

This model is not hard to build, but care should be taken to see that each wing has the same amount of sweep-back and each propeller has the same amount of pitch. Because of the fact that the following plans are drawn to exact scale, some of the minor dimensions have been left out, although these can be had by using a ruler.

Fuselage

The sides of the fuselage should be made first. All wood used for this part of the model is 1/16" square balsa. The longerons are each 11 9/16" long and should be pinned to a full-size layout of the side, while the uprights are ambroided between them. The two sides should be joined first at 7" then at 1", to 2", 3", 4", 5" and 6" in that order. The forward gunners pit is formed by thin bamboo strips about 2 1/2" long. The strips should be ambroided to one side and allowed to dry and then bent around and ambroided to the other side.

Center Sections: Upper Wing

First cut out six ribs 1 3/4" long and glue them to the wing leading edge which is cut from 1/16" balsa. The leading edge is 1/16"x5/32"x6 1/2". The trailing edge is next. This should be 1/16"x3/32"x6 1/2" and is slightly tapered so as to follow the rib curve. The support should now be set and glued. It is 1/16" square and 6 1/2" long.

The same directions should be used for the lower section which runs through the fuselage between crosspieces 2 and 3.

Motors

The radiators should each be cut from a block of soft balsa 1/2" x 3/4" x 1 5/16". These finished pieces should be hollowed out and with a slot cut through large enough to permit the motor stick and rubber motor to pass. The cylinders, (6 to a motor), are 5/16" high and should be mounted on a strip of balsa.

Motor Sticks

Both sticks are made of 1/8" x 3/16" x 9" white pine. A regular propeller bearing is glued to the end of each motor stick. The rear hooks of No. 12 wire are then fastened on.

Propellers

The propellers are each cut from a block of hard balsa 1" x 3/8" x 4 1/4". Much care should be taken to see that each propeller has the same amount of pitch as it increases the stability of the model. The propellers should also be very carefully balanced. This is done by sanding down the heavier side until balance is obtained.

Landing Gear

The landing gear should be attached to the center section and should be glued in place after the center section is papered. The four wheels are 1 1/4" in diameter and are *glued directly to the axles*. After the socket (c) is glued onto the axle support (d), one wheel should be glued to the axle, slipped through the socket and then the other wheel put on. The axle and axle support should both be made of bamboo because of the stress upon them.

Tail Surfaces: Fin

The fin outline (b) should be first bent either by steam or open flame and then the supports made and glued onto the outline.

Elevators

The elevators should both be made at the same time in one piece and then cut in half when ready to be put on.

Wings: Top Wing

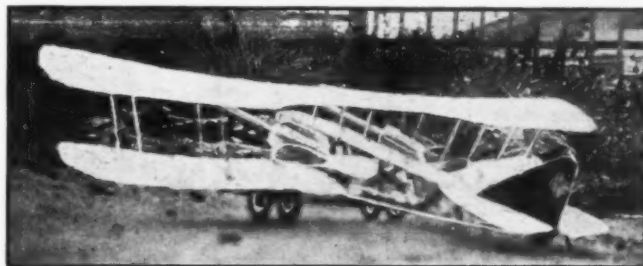
First cut out ten ribs 2 3/4" long and 3/16" high cutting out grooves for the leading edge, the two supports and the trailing edge. There should also be two ribs the same size as the center section ribs. When gluing ribs to the leading edges, do not forget to set them on an angle, especially rib No. 1, as there is both sweepback and dihedral. The wing-tips are bamboo and should be bent before placing them on the wings.

Lower Wing

The lower wing is the same length and height as the upper wing but it is 2 5/8" wide. This wing also has the same amount of sweepback and dihedral as the upper



The author gives 'er a trial flight



The completed model which will give you a real thrill in flight

wing. The wing struts are placed between ribs No. V and VI and III and X, and are ambroided to the supports.

Covering and Decorating

COVER the model slowly and with care, as a good covering not only increases the looks but also helps the model's flying quality. Although both sides of the wings and fin are covered, only the top surface of the elevators need be covered. All four sides of the fuselage should be finished. After the model is covered, all but the tail surfaces should be steamed and allowed to dry without being touched. This will give the paper sufficient tightness. The tail surfaces should not be steamed because of the danger of warping.

A simple and yet attractive camouflage is shown on Page 15 of the plans. This design should be put on the top and side surfaces only. It consists of thin solutions of black, blue and green paints. It may be put on with an ordinary water color brush. It is best to completely finish the whole plane in one color first.

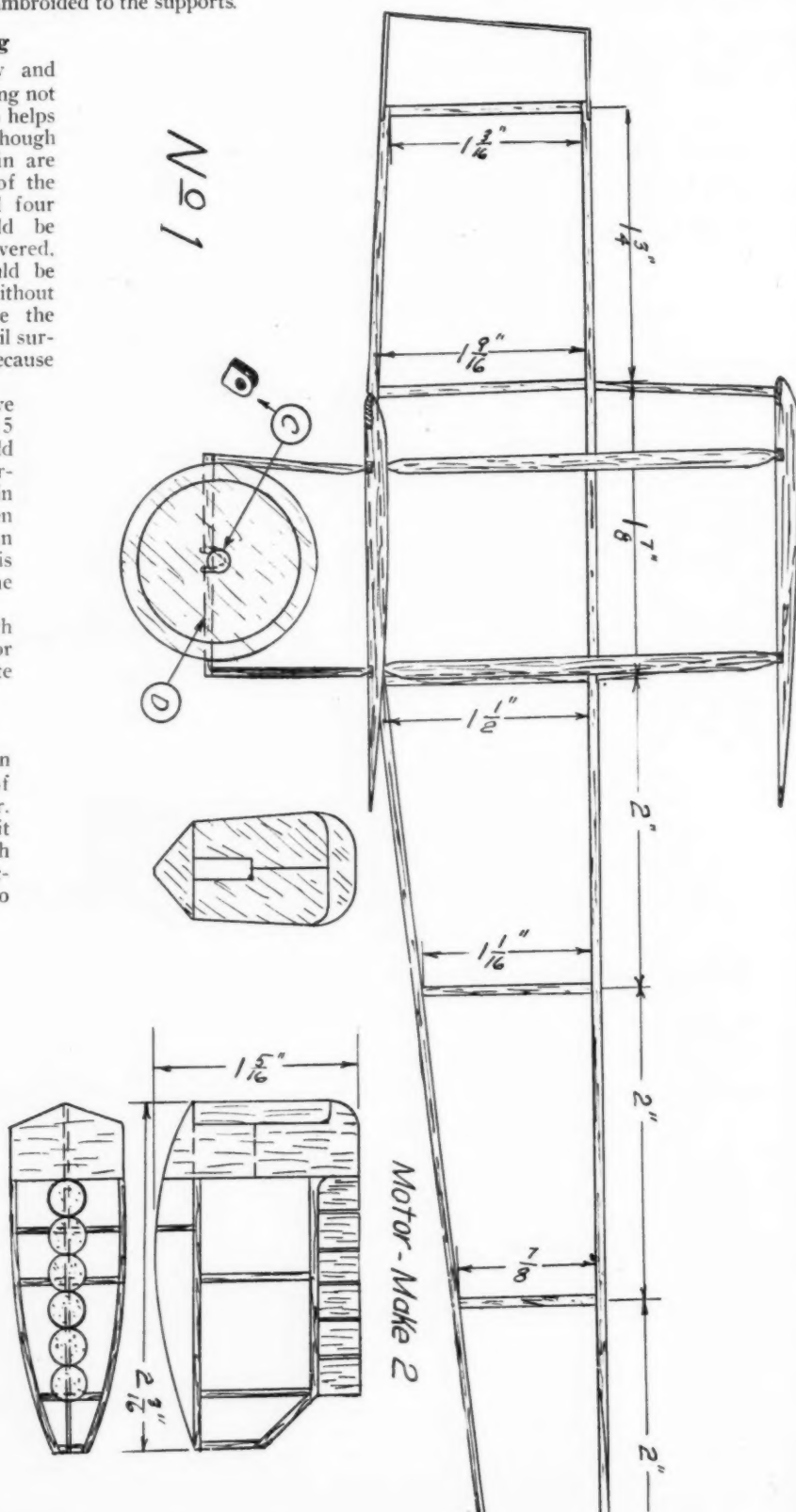
The fin should be black with either the black straight across or iron cross apparent with a white outline.

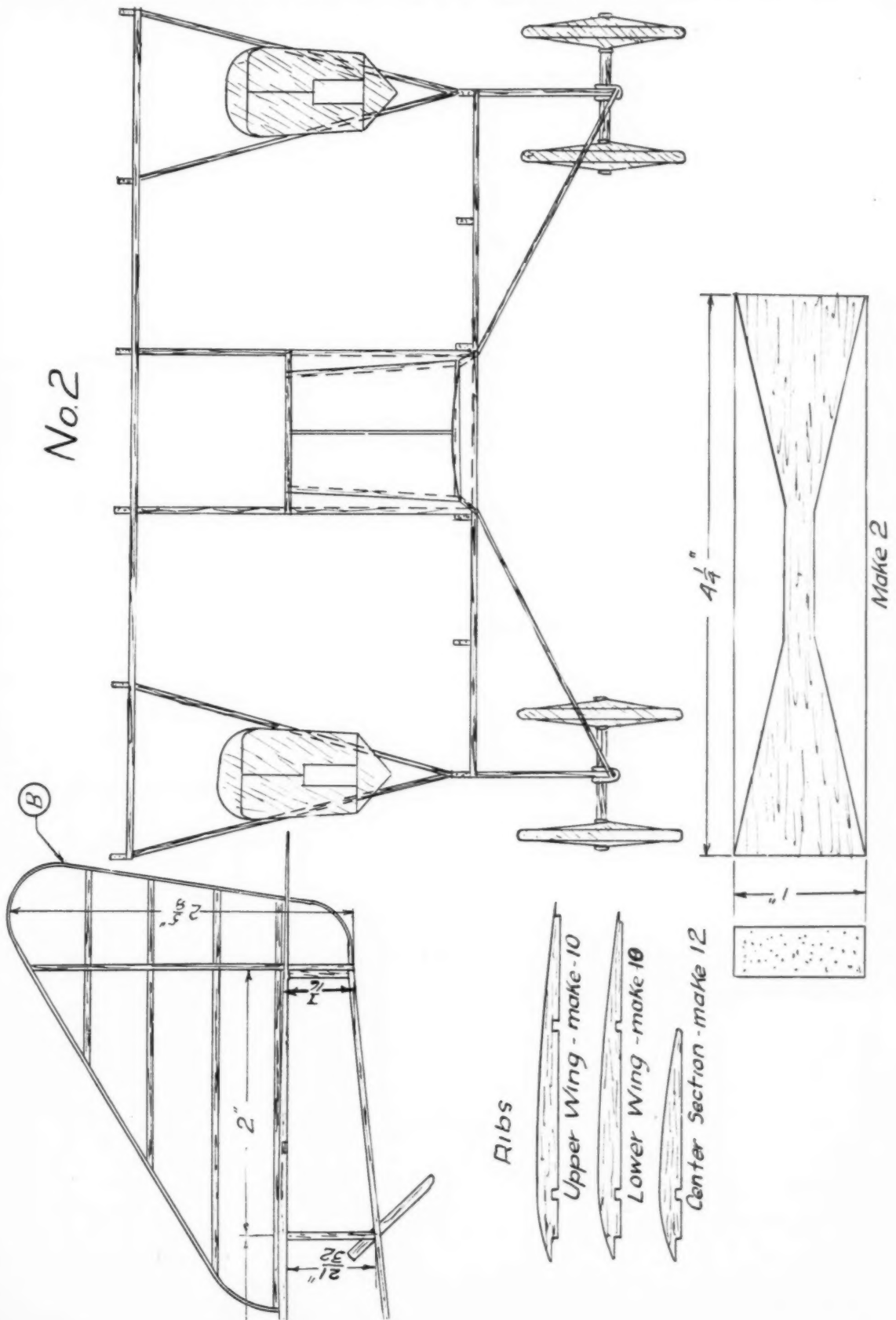
Conclusion

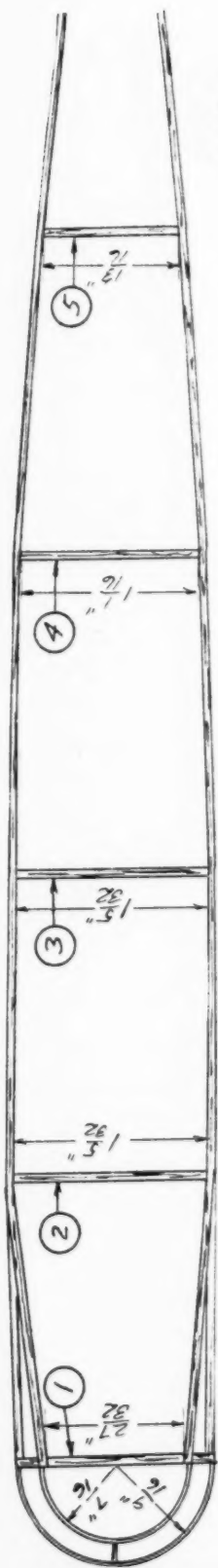
THIS model should be flown with two or more strands of $1/8$ " flat rubber for each motor.

Although it may seem a bit hard to build, it is well worth your while as it is not only attractive in its flying qualities but also in its appearance.

(Editor's Note:—It is always uppermost in our minds to give our readers plans of airplanes that they desire most of all. Therefore, we will greatly appreciate a word or two from you stating the name of the plane that you would like us to publish and whether you prefer that they should be presented as *solid scale models*, *detail scale models* or *flying scale models*. By sending us your opinion in this matter, you can co-operate with us in making *UNIVERSAL MODEL AIRPLANE NEWS* a medium of greater service to our many friends.)

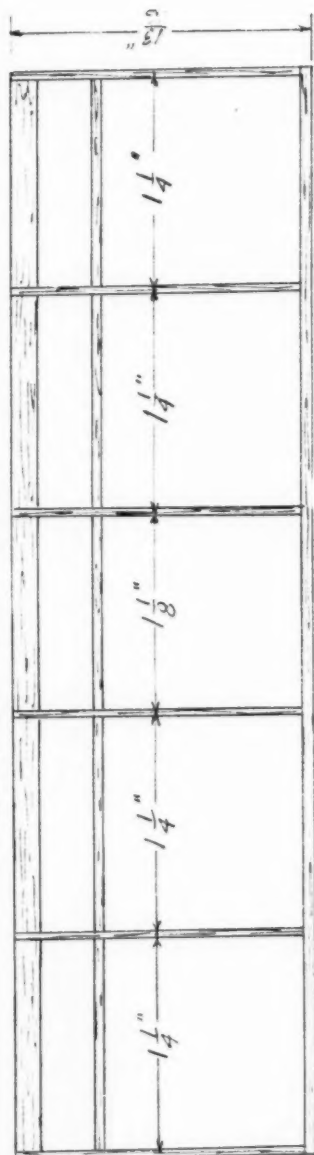






No 3

Center Sections



Top Wing



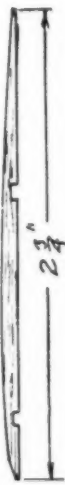
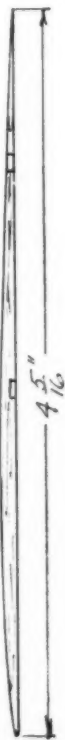
Bottom Wing



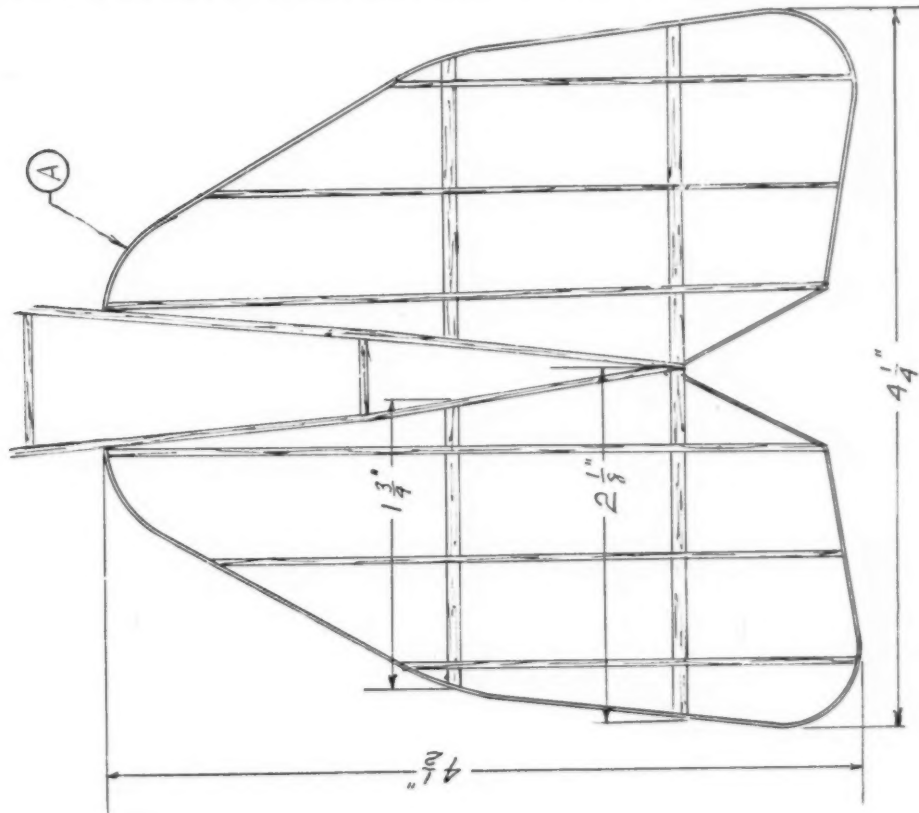
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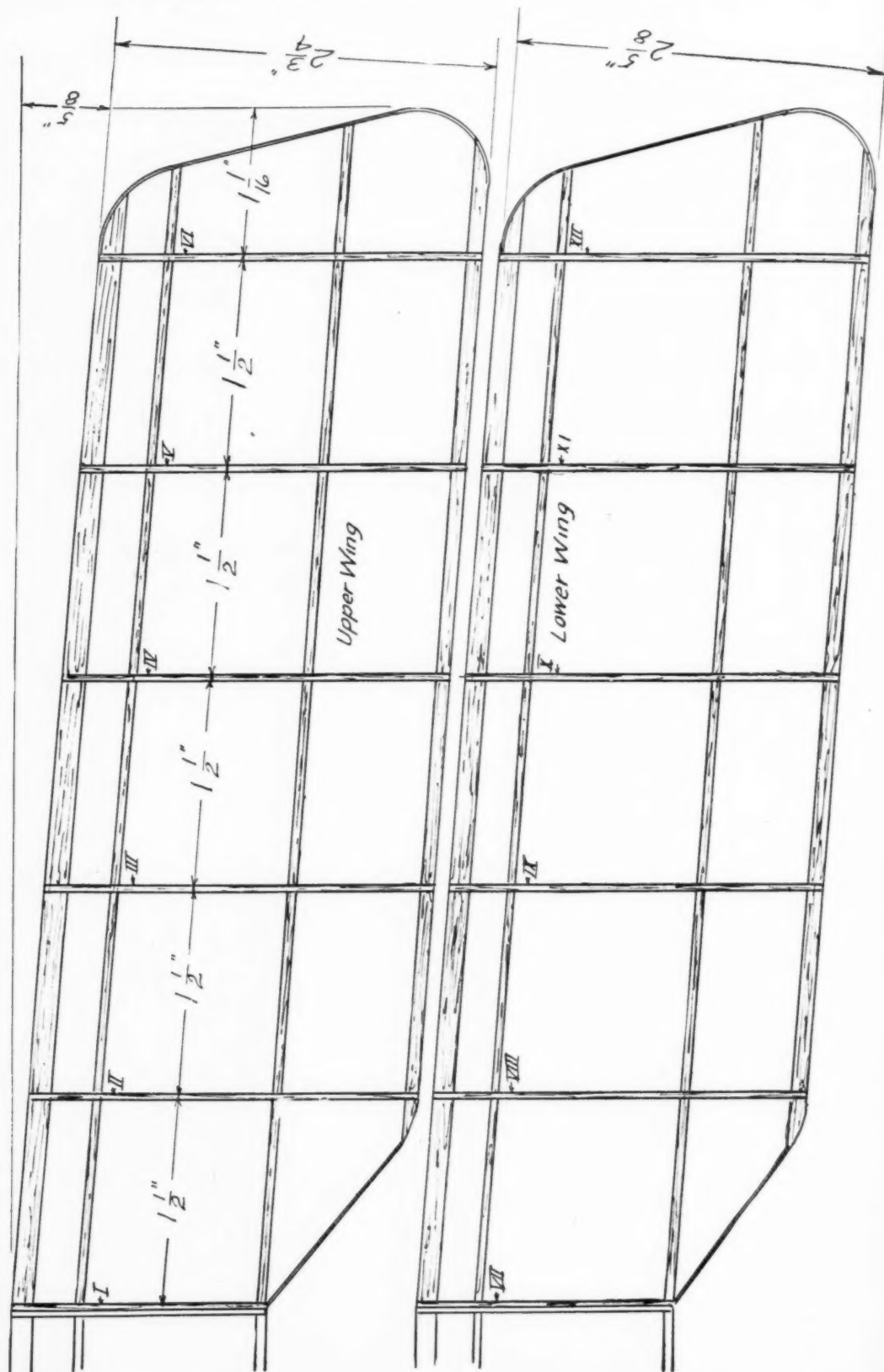
Elevator Ribs - Make 2 of each



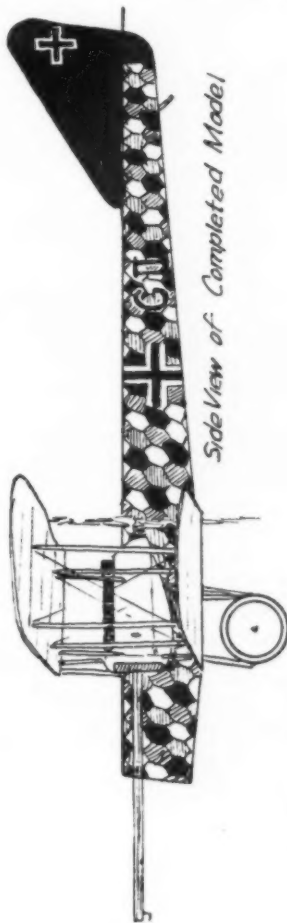
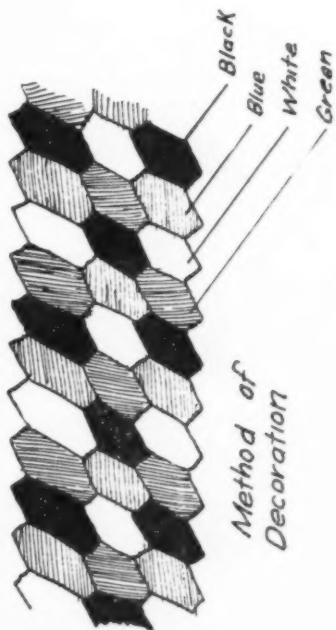
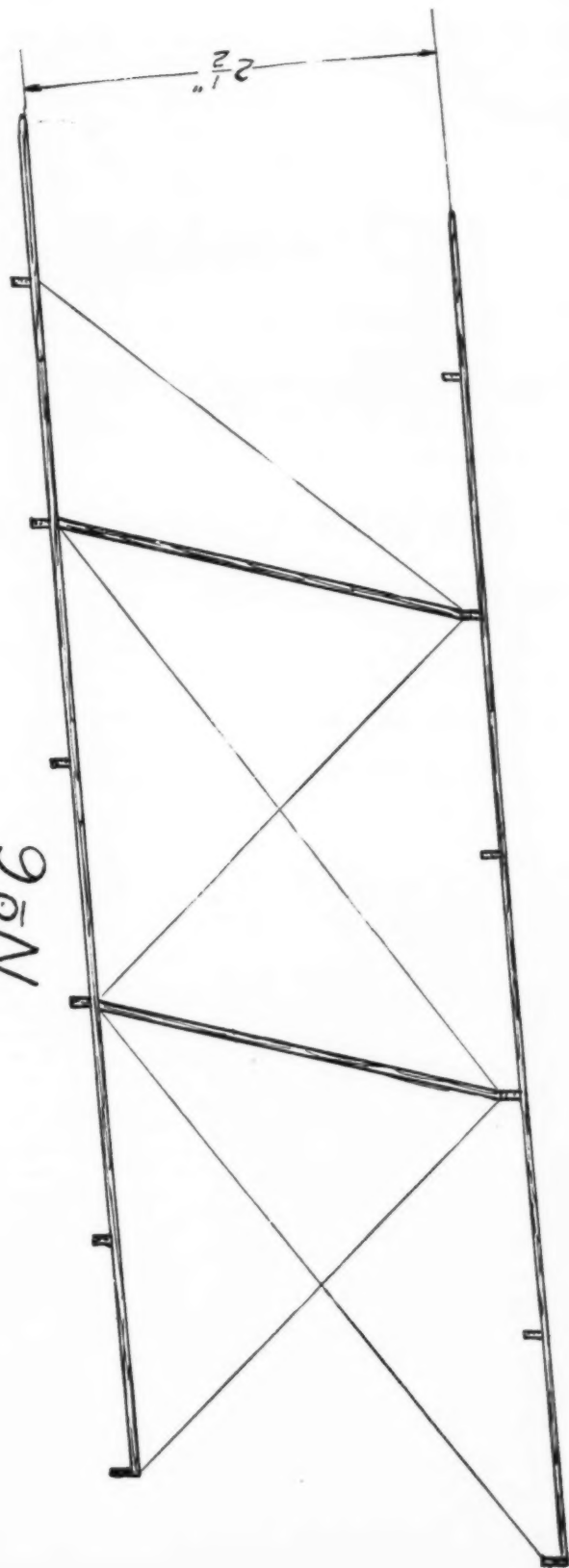
Fin Ribs Make 1 of Each



No 5



No 6



Motor Stick





One of the first autogiros built for the British Air Ministry, 1926.

A Pioneer Makes Good

The Story of the Successful Development of the Autogiro by Cierva and the Application of it to Commercial Use by Harold Pitcairn

By Orville H. Kneen

CHAPTER II

WE left young Juan de la Cierva, you remember, nervously waiting for an equally nervous pilot to test his No. 3 machine. It had a queer 5-bladed rotor and a complicated rig whereby the pilot could change the angle of incidence. This, he hoped, would finally correct the crazy, drunken leaning to one side that had made all his previous designs useless.

The pilot taxied slowly across the field, his machine wabbling but not quite turning over as previously. He opened her up a bit and the contraption seemed almost ready to hop, as did the inventor. But his practiced eye noted that same habit of wanting to lean on something. Not so much as before—but rigid advancing blades *still* had too much lift. Changing angle of incidence was no great help, if any. But he felt he was on the right track. He worked twice as hard. *Nine times* he remodeled that stubborn machine. At every test it showed some signs of intelligence. But it needed something—a new idea.

Luckily, about this time the government showed interest, to the tune of some real money—\$34,000 worth—for wind-tunnel

experiments. Scores of tricky little whirlingigs, mounted on ball bearings, were put through their paces in tunnel winds that attained 45 miles an hour.

Cierva measured the lift of his rotor when inclined. It proved greater than for fixed wings of equal area. Head resistance was lower than for fixed wings of equal lift, proving his figures okay! So he put his nose to the drawing-board again and drew pictures of a new ship, with five-bladed rotor braced to the axis by steel wires. This time, to keep his ship from leaning over, he built an extra large elevator in two parts, each part to be operated by itself. He then trundled the new machine out for a test—the proof of all theories.

After all his testing and figuring, the blankety-blank thing *still* tried to lean over! And gyroscopic action was bad. The thing would not be controlled. It had no ambition to get up in the world. But it seemed better than previous ones.

So he rebuilt it—four times—and studied it a thousand times. One night he was at the theatre. His mind wandered from the play, as he thought about one little rubber-driven model which had shown



Mr. Harold Pitcairn with the Collier Trophy awarded to him, after landing his autogiro on the White House lawn.

up well in the wind-tunnel.

Suddenly there flashed into his brain an explanation. Perhaps the flexibility of the blades, made of rattan (or bamboo), as they met the oncoming air, enabled them to adjust themselves automatically. His aircraft—if he ever got it up in the air—would have to ride the whirls and eddies, whereas fixed-wing planes cut through them. His craft must ride them slowly, like a bird, and his rotor should be constantly adjusting itself to the currents, like the wings and tail of a bird.

CALCULATIONS seemed to prove this theory correct. Long weeks of work produced four long, thin blades of laminated hardwood, mounted on a hub supported by a spider, or pylon, rising from the fuselage. It was a queer-looking rig. But it worked better!

When not turning, the rotor blades hung down almost to the ground. But at around 100 revolutions per minute they swung almost straight out, like the outswinging pail of water on the end of a rope.

The pilot swore he could feel their lifting power. The machine would tremble, as if ready to leap into the air. Cierva tried out combinations of two, three, four and five blades. And finally he evolved a scheme of "articulating" the blade fasteners so that the connection of each blade to the hub should be non-rigid. This should enable each blade to freely adjust itself to the load, and to gusts of wind.

Being hinged besides, the fastening was really a universal joint, cables between the blades keeping them from running into each other. But now the blades acted much like a bird's wing, able to wriggle, flop, rise or fall as load and air currents required. As a blade advanced it could be seen to rise at its tip, reducing the angle of incidence and resulting lift. Retreating blades did the opposite.

That, the young inventor believed, should at last balance the machine. Perhaps he uttered the Spanish for Hot Dog! The machine should now be perfect, at least as far as leaning over was concerned.

But it wasn't. The pilot did not seem to have enough control



The autogiro proves of great help in locating and fighting forest fires

of the contraption. However it no longer had bad gyroscopic habits. The articulated blades stopped that far better than one scheme he had tried, crudely, of having the pilot tilt the entire rotor structure to right or left.

Would he ever be able to lick that tendency to imitate a cow at the end of a rope. He perspired, rebuilt the machine just fifteen times, and found the answer at last. He stuck a pair of flip-

pers out from the fuselage, on either side. Really two small ailerons, on arms. They gripped the air—theoretically.

Would the machine actually fly—or hop—or at least stand straight with the rotor turning? He thought so.

But his heart thumped harder, when it was ready for test, than when his big bomber had been trundled out for its trials, over three years previously. On January 9, 1923, all was ready. The strange bird, perhaps more full of "bugs" than a real one, was taken to the Getafe Airdrome, near Madrid, where there was plenty of room. Now for the proof of the pudding!



Harold Pitcairn explaining the operation of the machine to Orville Wright at Langley Field, Va., May, 1929.

PROBABLY no one except the inventor expected the thing to get off the ground. Even he may have had his doubts. So many, many designs had failed, laying down weakly, savagely splintering their long arms on the ground.

The pilot was one of Spain's best—Lieut. Alejandro Gomez Spencer. His strange steed embodied a lot of time and labor and money. He handled it with care. Several men, pulling on a long rope wound around the hub, brought the four-

bladed rotor up to speed. The motor, not connected with the rotor, but driving a tractor propeller in the usual way, warmed up cheerfully and loudly.

The pilot waved to the anxious inventor. He taxied slowly to increase the speed of the rotor.

The machine taxied easily, did not lean weakly. He "gave her the gun." The whirling vanes took the load. There were cheers as the wheels lifted a few inches. The machine hopped, skipped and jumped across the field. Then, with sudden resolution, the pilot opened the



One of the late models, the Pitcairn T.A.-18.

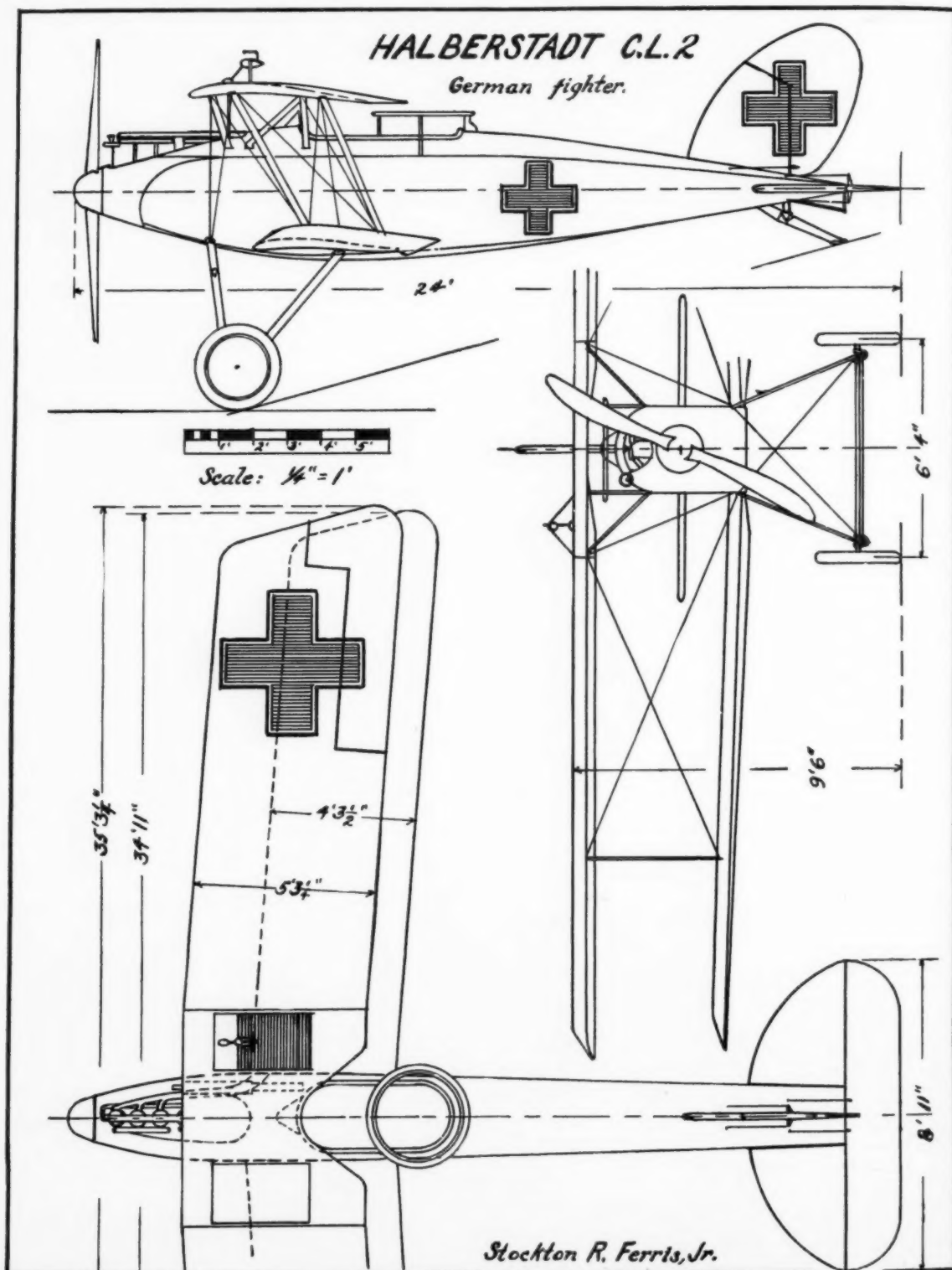
(Cont. on page 37)

THE HALBERSTADT C.L.2 GERMAN FIGHTER

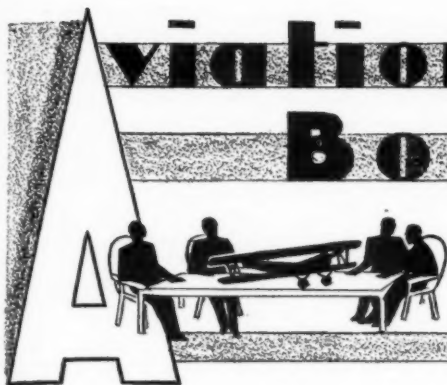
THIS was one of the most highly developed German two-seater fighters in use at the end of the war. It was so classed because of its maneuverability and visibility rather than because of performance. Powered with a Mercedes 180 H.P. engine, it had a

high speed of approximately 105 M.P.H., climb of 500 feet per minute, and landed at 55 M.P.H.

In building a model of this plane, note that the trailing edges of the inner ribs of the lower wing are turned up so as to produce a smooth contour with fuselage.



Aviation Advisory Board



Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board

Formerly of
The Technical Section, Air Service, U. S. Army

HELLO, fellow model builders. I always look forward to this little chat with you. Due to my numerous duties it is not possible for me to interview each one of you separately, so we must content ourselves with this short discussion each month.

As usual, we have some very interesting questions. One which I feel is especially worth while to answer, comes from Calvin Stickel of Mount Vernon, South Dakota.

Question. Which is the strongest wood, pine or spruce?

Answer. Spruce is the strongest, although it is a little heavier. Pine weighs approximately 24 to 26 pounds per cubic foot. Spruce weighs 32 pounds per cubic foot. Even so, spruce is much stronger for its weight than pine. The use of pine in airplane construction is, we might say, a hangover from model boat building, and personally, I advise the use of this wood be entirely discontinued. It is easy to work. This explains its use in hulls for model boats. It is inadvisable to use in airplane construction because it snaps quickly and suddenly under sudden stress. In order to make a pine structure as strong as a spruce structure, it would be necessary to make it at least 50% heavier than spruce. A good substitute for pine in making propellers, is basswood. The results when basswood is used are far superior.

HERE are a few questions from Leo Garcia of Albuquerque, New Mexico.

Question. Why will some models, when the wing is set for normal glide, tend to climb too fast and then, if the wing is set for normal flying, the model glides at entirely too steep an angle?

Answer. This is due to the fact that the stabilizer is set at too negative an angle. It should be raised slightly until, through trial, the proper setting has been determined. When the stabilizer is raised it will probably be necessary to increase its area so as to obtain proper stability.

Question. Will too much propeller surface give the same bad result as too much rubber?

Answer. No, it will not. Very few machines have too much propeller surface. The opposite condition usually prevails. Too much rubber usually causes too much torque, while large propeller surface will usually reduce the torque, for the simple reason that the propeller surface on the average model is too small.

Question. How should the areas of rudder, elevator and wing compare on an r.o.g. model?

Answer. The rudder area on an r.o.g. model should be approximately 15/100th of the wing area. The elevator should be about 30% of the wing area. These figures hold true where the distance from the main wing to the center of the tail surfaces is equal to half the wing span. If the distance is shorter than half the wing span, then the surfaces must be increased in direct proportion. They may be decreased in area proportionally, if the distance is greater.

Question. Should a reversed camber elevator have more or less surface than a flat one?

Answer. I assume by the term, reversed camber elevator, that you mean an elevator which is concave upward and convex downward. Under these conditions, less surface will be necessary when using this type than if a flat one were used because when set at zero degrees, the negative curve surface is exerting a pressure downward at the rear of the ship, as a curved surface has a tendency to lift, or when reversed, press downward at its setting of zero. A flat surface obviously set at zero degrees, will not cause any pressure downward or lift upward. Even though the flat surface is set at a negative angle, it will not be as effective as the curved one in creating a tail load.

Question. What is the highest and most efficient angle of attack on a wing surface?

Answer. The angle of (Continued on page 41)



Here is the little plane "Hearts Content" that cheated the Atlantic of another sacrifice in the name of progress. It is a De Havilland Puss Moth, flown by Captain J. A. Mollison, from Ireland to New Brunswick, Canada, in 30 hours and 12 minutes. A record for a westward crossing, from land to land.

AIR-WAYS

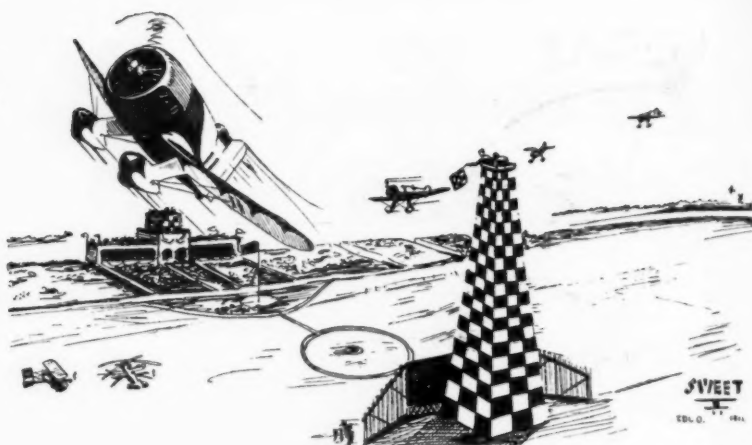
HERE AND THERE

Get Busy and "Air Your Ways" of Building and Flying Model Planes. In This Column, Space Will be Devoted to the Activities of Our Readers. Let Others Know What You Are Doing

OUR readers have contributed some very interesting features for our Air Ways section this month. There has been a great volume of material sent to us and let me tell you, it's some job to look over all of the interesting things that you fellows are doing and about which you wish us to tell your friends in this column.

After much labor we have selected some material that we feel will be most interesting because of their unusual features.

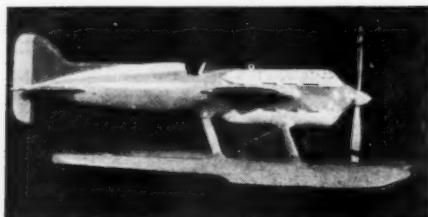
Our friend, Robert Sweet of Columbus, Ohio, has remembered us again with a sketch showing the Gee-Bee rounding a pylon at the Air Races. This appears at the head of the column to liven the appearance of our pages. Those of you who have read this column each month will remember that



Picture No. 1

Sweet is a young man of sixteen who has been bedridden for some time. We appreciate his contribution very much indeed.

Manley Mills of Royston, Georgia, has sent us picture No. 2 of Al Williams' "Mercury"



Picture No. 2

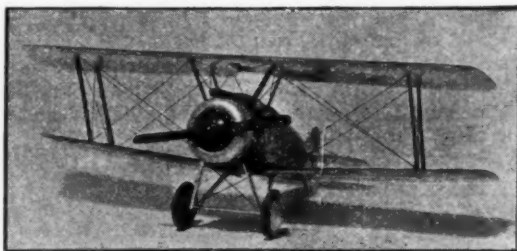
racing seaplane which was built by his friend Jimmy Cherry of Decatur, Georgia. It has a span of 12" and is a very nice piece of work. I believe that this is the first time a picture of this ship has been submitted to the magazine.

Here is a model of a Curtiss-Wright Sedan, picture No. 3, partially finished, in the hands of William M. Wohlleben, which was constructed by Robert Smith, the author of the article on the Sopwith Dolphin. Smith is one of our most active model builders. He lives at Norwich, New York.



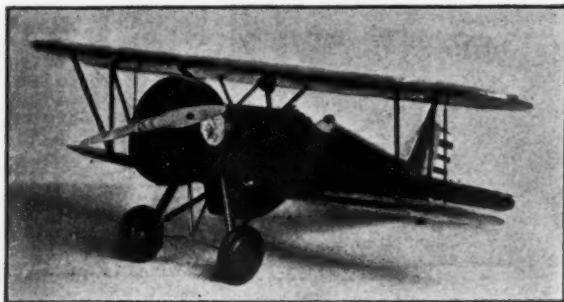
Picture No. 4

PICTURE No. 4 shows Harry H. Van Kirk, Jr., of Condit, Ohio, and Colonel T. J. Herbert of the Ohio National Guard, who is holding the model of a Douglas O-38 of the 112th Observation Squadron. Van Kirk built and presented this model to Colonel Herbert during the Squadron's encampment at Camp Perry last summer. If Colonel Herbert takes advantage of this gift to do a little experimenting in the way of flights, it is possible that he may obtain some interesting data concerning the stability



Picture No. 5

of the Douglas planes. Model flying would not only be an interesting pastime for military men but possibly would be very instructive, as it has proven to be to the young generation which is so active in this field at the present time. I would like to prophesy here, that these young model build-



Picture No. 6



Picture No. 3



Picture No. 7

ers of America are going to show the old-timers a trick with a hole in it when they grow up, as they are obtaining information on model flying of which the present-day aeronautical engineers have no conception.

Robert D. Heidenreich of 145 Aurora Street, Hudson, Ohio, has sent us some pictures of interesting solid scale models which he has built. Picture No. 5 shows one of them, a Sopwith Camel. Heidenreich has made a very neat job of this ship. He also has sent us a picture of an Autogiro model which was built from plans supplied by the Autogiro Company. This, we have been unable to publish because of lack of space. However, those who wish information concerning this ship, may write to Heidenreich.

HERE is Picture No. 6 of a Boeing P-12 D, built by Marvin Krieger of 91 West State Street, Sharon, Pa. Every part of it is built up and contains the exact number of ribs and braces found in the large ship. The wings and fuselage are covered with Chinese silk and tail surfaces and ailerons with corrugated aluminum. The detail of the controls and instruments are complete, including miniature maps, a machine gun, safety-belt throttles, stabilizer adjuster, etc. Even the P & W Wasp engine is detailed to the extent of having wires leading to the miniature spark plugs. Krieger says that he would be very glad to give

hints on building or more details on this model, to any of the readers who wish to write.

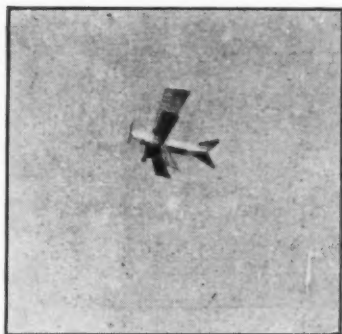
Here is a young man who works fast. A. F. Kitchel Jr., of Greenwich, Conn., sends us picture No. 7 of a Boeing Bomber model built from the plans in *UNIVERSAL MODEL AIRPLANE NEWS*. He has evidently modified the plans of this ship and has built it in miniature as indicated by the smokers pipe which is lying on the ground, immediately in front of the ship. It has taken a little ingenuity to scale down the plans so that he could build this miniature model. It is a nice-looking job.

Here is something that I feel will be of great interest to our readers. It indicates that America is not the only place in which there is great activity in aviation. Joe Axisa of 3, Sda. S. Guiseppe, Sliema, Malta, Europe, writes and tells us about a 14-foot glider kite which he has built and flown. Picture No. 8 shows the machine, with a boy standing beside it, in order that you may get some idea of its size. Picture No. 9 shows the plane in flight at the end of a rope. When this picture was taken, it was at a height of 400 feet. Joe tells us that his ship stayed up for two hours and in time he expects to have it climb to an altitude of two or three thousand feet. He has promised to send the details about it and its performance, later. Possibly this will give some ideas to the young men in this country and start a new and interesting sport. It might even be possible to build a machine of this type that would carry aloft a man. We wish to thank Joe extremely for this contribution. It is of great interest.

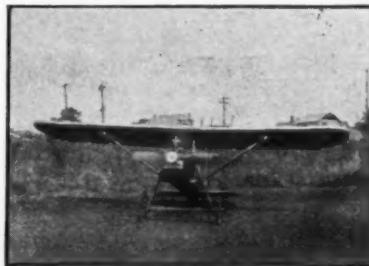
THERE seems to be increasing activity in the building of gasoline powered model planes. Last month we published pictures of the successful model flown at the National Model Airplane competition at Atlantic City, built by Maxwell Bassett. Here we have Picture No. 10 of another machine of this type which was built by Hilary Strzelczyk of 19 Kelly Street, Luzerne, Pa. It has a wing span of 6' 2", and is 4' long. Hilary is very candid in telling us that the machine was a "flop." However, he deserves a lot of credit for his attempt in this new field of model building. If he keeps at it, as he says he is going to, he will unquestionably build a successful model eventually.



Picture No. 8



Picture No. 9



Picture No. 10



Picture No. 13



Picture No. 11



Picture No. 12

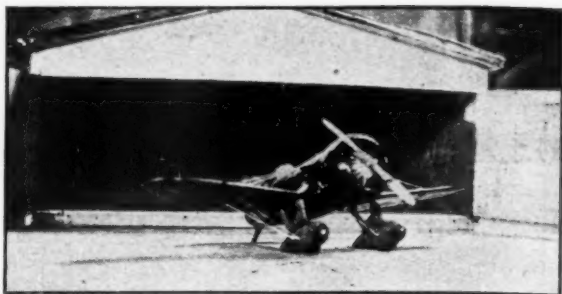
It often takes several years to develop a model of this type which will fly properly. He is to be admired for his frankness and his ingenuity.

Picture No. 11 shows Jack Wilson of Chrome, Pa., standing beside a Heath monoplane which he has just finished. This machine was built in spare time and Jack Melver of 705 Hodgson Street, Oxford, Pa., the young man who took this picture, tells us that it is a beautiful job. It seems that some of the model builders are now growing up and trying their hand at large plane construction. More power to them.

Judging from our correspondence, **UNIVERSAL MODEL AIRPLANE NEWS** is promoting the aviation spirit in all parts of the world. Ravi L. Kirloskar of Panchgani, Satara, India, sends us Picture No. 12 of himself and a model B.F.W. M23c, which he is holding and which he tells us flew for more than two minutes, landing beautifully like a real ship. This young man is evidently no slouch at model building. In his letter he has written and told us that he has built many ships from plans published in this magazine, including a Lockheed Vega and an S.E.5. We appreciate Ravi's contribution exceedingly and are pleased to know that our magazine is helping young men in foreign lands as well as in this country.

Picture No. 13 shows an S.E.5 and a Fokker in flight, built by Fred Fettig of Elm Street, Newport, Ky. This picture is unusual in that it shows two planes in flight at the same time. Those of you who have tried to get photographs of flying models, realize that this is not an easy thing to do.

In Picture No. 14 we see a trim mail ship flying across one of our readers' backyards. At least this is the impression that it gives us. However, Henry B. Sait of 238 East Seventh Street, Claremont, California, tells us that he has faked this picture. Actually it is a model with a 6" wing



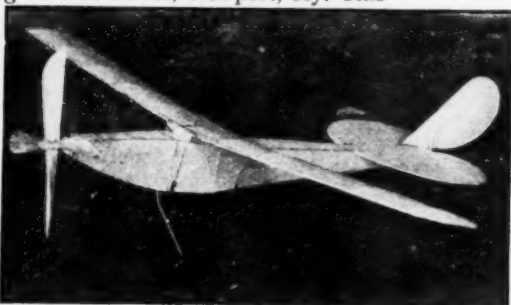
Picture No. 15



Picture No. 18



Picture No. 16

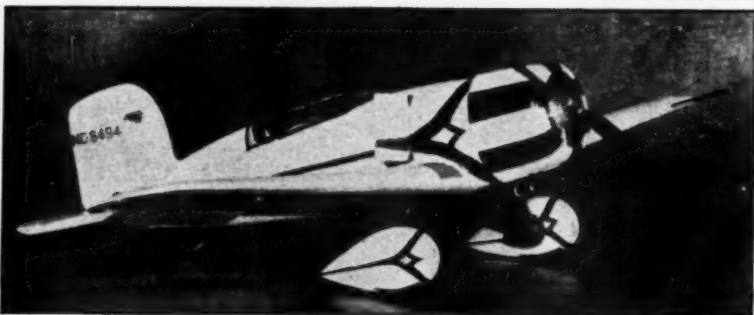


Picture No. 23

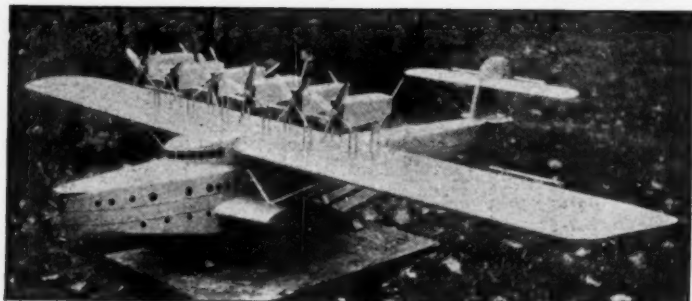


Picture No. 17

span, held up by a string, a few feet in front of the camera. This goes to show what can be done through the medium of trick photography.



Picture No. 19



Picture No. 20

It seems that some of our young men are establishing their own private airports. Picture No. 15 shows the airport of Marvin Riha of 14895 Rutherford Street, Detroit, Mich. The only trouble with this airport is that it is merely a model one, with a Gee-Bee Sportster rolled out on the tarmac. However, an

idea built in form of a model may soon grow to full proportions. It may not be very long before Riha has the real thing in the line of an airport. The Gee-Bee shown in the picture has a home-made steel cowl and a motor composed of 300 pieces. The ship is complete in every detail.

Another young man is going into the model airport business. Roy M. Hardy of Beeville, Texas, sends us Picture No. 16 of his layout of five solid scale models in front of his hangar. They are, Curtiss Hawk, Boeing flying boat, Junkers Bremen and two Fokker D VII's.

We have a fine contribution from Richard D.



Picture No. 21

IT seems that one of our expert builders in far off Hawaii, S. T. Wong of 1865G Elena Street, Honolulu, has included in his letter, several pictures of ships which he has built. Picture No. 18 shows his fuselage ship in full flight. It has a wing spread of 40" and is driven by a 15" propeller. In the front, the fuselage is rectangular and tapers to a triangular form in the rear. Wong has also built a Polish Fighter from plans in the magazine, from which he has secured some very unusual flights. He tells us that this machine climbs to a height of 50' with unusual speed. The staff of the UNIVERSAL MODEL AIRPLANE NEWS wishes to extend hearty congratulations to S. T. Wong for his unusual work in a location where there is not a great interest in model aviation.



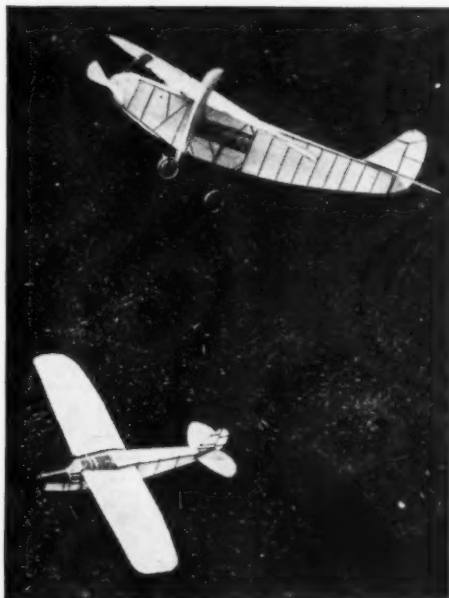
Picture No. 24

Dilley of 524 Pelham Manor Road, Pelham Manor, New York. He has sent us ten pictures of his Curtiss Hawk. However, we

are unable to print all of them. Picture No. 17 shows one of the best views of the model. Dilley has spent a great deal of time on this ship and incidentally has expended over \$48.00 in its building and repair. That word, repair, is very impressive. We would say that Dilley has been doing a little flying in restricted areas. However, what is the use of building a model unless you can fly it. This model was on exhibition at Proctor's in New Rochelle and attracted a great deal of attention. The specifications will surprise you. The span of the upper wing is 5' 3". It weighs less than one and one-half pounds and is powered with a six cylinder radial compressed air engine. Dilley would probably be very glad to give further details to readers who are interested in his ship.



Picture No. 14



Picture No. 22

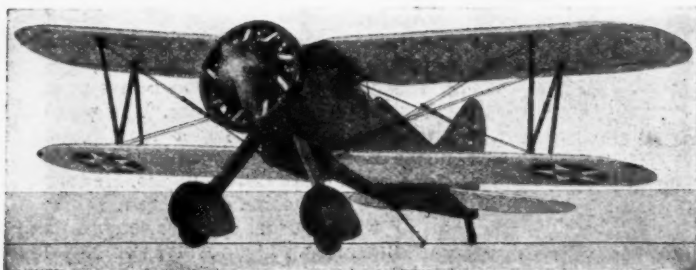
sire further information about any detail.

Picture No. 20 is a contribution from a veteran model builder. Those readers who (Continued on page 44)



Picture No. 25

These long fall evenings



AKRON FIGHTER F9C-2

Deck Level Photo Shows It Coming in for a Deck Landing with Hook of Cleveland's New Arresting Gear Dropped in Place.

The U. S. Navy's newest and smallest Curtiss fighter. It is Cleveland's new beauty destined to be the successor of the Laird Super-Solution for beauty and flight and almost everyone knows of the Cee-Dee Laird SF-5 (which sells at \$2.50). It is a very consistent flying model and a real beauty in appearance. Detailed only as Cleveland details its models, including authentic gull-shaped upper wing at the proper dihedral angle, the two-leg landing gear which is very strong when built as Cleveland designs 'em, windshield, lights, etc. All balsa comes printed and numbered on flat sheets including curved parts, dummy motor, motor end rings, wheels and all—making it easier than ever to build Cee-Dee ships now! Neither this ship nor the new Boeing is at all hard to make if some model experience is had. The fact is that they are about as simple as the Howard to build, but having more parts the same as the simple Cee-Dee model, take longer. Being a 3/4" scale model, its span is 18 1/2", length 15 1/2", weight 2.2 oz. Colored-silver wing, and tail, everything else blue except details, which may be colored black with ink. Complete Kit SF-22 (with everything needed, including Cleveland's new enamel dope) only \$1.95 postfree.



Two Striking Views of the LOCKHEED VEGA

Here is a real model of this famous ship—as you thousands of men and boys have requested. And we mean REAL! First time this authentic Cleveland-Designed model was put on display, our engineers were told it was one of the most beautiful scale models ever designed—and that was from not only model builders, but model sellers as well. This model follows no particular Vega, but the color scheme is that of Amelia Earhart's red and gold monoplane in which she recently spanned the Atlantic. For flights this Cee-Dee model is a wonder. Don't delay getting it. Span is 30 1/2"; length 21"; weight 5.7 oz.; colored brilliant red wings, tail surfaces and wheel shoes; everything else gold except black details, for which ink may be used. Kit is complete in every respect even with the new enamel dopes and printed balsa same as A-9 Attack Kit. Complete Kit SF-24, postfree \$2.95. (Special Delivery, for U.S. customers only, 25c extra.)



BOEING BOMBER

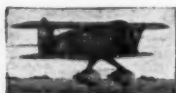
The 3-mile-a-minute military monarch cleverly modeled in true Cee-Dee fashion. Its three motors feature the new type Cee-Dee power unit—no exposed rubber. 3/4" scale. Span 29"; length 19 1/2"; weight 3 oz. Colored yellow and green. Complete Kit JSF-1005 (everything needed) only \$2.50 postfree.

Great Lakes Sport Trainer

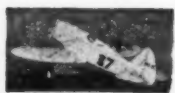
Redesigned—much improved over the original Cleveland-Designed model that has become popular in many countries. Easier to build. Files hundreds of feet. Span 20"; length 15 1/2"; weight 1.2 oz. Colored orange and black. Complete Kit SF-1 (everything needed) postfree only \$2.50.

All "C-D" Models are Guaranteed

to be as represented or your money will be refunded. Defective parts replaced, except broken strip wood, unless all are broken. If Kits are returned for any other reason, a 50c charge is made—west of the Mississippi, 75c. Please read descriptions carefully.



LAIRD SUPER-SOLUTION
Maj. "Jimmy" Doolittle's own racer—the 1931 transcontinental record breaker. Files hundreds of feet. Flashing speed. 3/4" scale. Span 15 1/2"; length 13 1/2"; weight 1.7 oz. Colored yellow and green. Complete Kit SF-5 (everything needed) only \$2.50 postfree.



HOWARD RACER

Well-known 1931 National Air Race winner. 3/4" scale. Keen flyer. Unusual value. Colored with Cleveland's new white pigment aircraft dope. Span 15"; length 13 1/2"; weight 1.3 oz. Complete Kit SF-18 (with everything needed) postfree only \$1.00.

if you're building a Cee-Dee authentic

Here's an indoor adventure that grips you. It's a challenge enthusiastically to a home run with the bases loaded, a range—anything above and beyond the ordinary! And—something about the building of them that you just have to feel accomplishment—step by step you are definitely a cleverly engineered result. From the moment you start you're following expert counsel, and with all the necessary sport—and a hundred thousand "Cee-Dee" enthusiasts.

All Cleveland-Designed Models are FLTI Models

Here is the Entire "Cleveland-Designed" List

Every One Complete—Every One the Duplicate Set Far in Excess of Its Modest Price

Authentic 3/4 in. Scale Flying Model Kits

SF-1: Sport-Trainer .. \$2.50	SF-14: Fokker Triplane \$2.50
SF-2: Mystery Ship .. 2.95	SF-15: Fokker D-7 .. 2.50
SF-3: DeHavilland-1 .. 3.50	SF-16: Albatross D-3 .. 2.50
SF-4: Curtiss Jenny .. 2.95	SF-17: Gee-Bee .. 1.50
SF-5: Doolittle's Laird .. 2.50	SF-18: Howard Racer .. 1.00
SF-6: Polish P-6 .. 2.95	SF-19: Supermar. 80-B .. 2.50
SF-7: C. Hell-Diver .. 3.50	SF-20: Hawker Fury .. 2.50
SF-8: Boeing P.12C .. 2.95	SF-21: Hawk P.6E .. 2.50
SF-9: SE-5 .. 2.50	SF-22: Akron Fighter .. 1.95
SF-10: Sopwith Camel .. 2.50	SF-23: Boeing XP.985 .. 1.95
SF-11: The Exper. Quad .. 2.50	SF-24: Lockheed Vega .. 2.95
SF-12: Nieuport Scout .. 2.50	SF-25: Curtiss A-8 .. 2.95
SF-13: Spad 13 .. 2.50	

NOTE: Cleveland's new completely printed out and numbered balsa models Kits SF-22, 23, 24 and 25.

Cleveland-Designed Models are considered by thousands of those who know, as the Standard of Comparison.

VOX POP

"In reading your latest folder I discovered that you included among your testimonials one which I wrote more than a year ago. I had only purchased two models then. I now have twelve of your models and find it impossible to compliment you enough. And I don't mean just for appearance and flight ability, but, more to your credit, I believe that you have transformed the construction of model aircraft from an interesting hobby to a most worthwhile pastime."

Irving M. Bailey, 621 Elm St., New Haven, Conn.

"Please send me your Catalog. I have heard of your company in a good way among my friends, who think it is the best they have dealt with."

Illinois.

"I must write to tell you that I never got a better, more complete kit, for twice or three times the amount I paid, than your Howard Racer."

New York.

"My father sent to you for the Cleveland-Designed Laird. Only having built but one plane before, I thought it would be hard, judging from the picture. But I was badly mistaken, it took but a week to build it and I worked only nights on it. It took off beautifully and flew for a distance of 1051 feet and 21 inches in 191 seconds."

Michigan.

"Your models are the most exact I have ever seen."

Vermont.

"I bought a Cleveland-Designed model and it is the best plane I've built in my 17 months of experience."

Ohio.

"I won first and second prizes in a neighborhood contest with your models."

Pennsylvania.

"I purchased one of your Fokker D-VII kits. It completely surpassed all of my expectations. I can truly say you have the best line of models on the market."

Kansas.

All photographs on this page are of the authentic C-D Models themselves. We never use photos of the real ships.

Cee-Dee Kits are Internationally Famous

Besides being sold throughout the U.S. and its possessions, and in all provinces of Canada, Cleveland-Designed Flying Model Kits are purchased by model airplane builders of 32 foreign countries. Christmas Orders for delivery outside U.S. must be placed now.



FOKKER TRIPLANE

Baron Von Richthofen's plane. 1918. Span 17 1/2"; length 13 1/2"; weight 1.7 oz. Colored red, black details. Complete Kit SF-14 (everything needed), postfree, only \$2.25.

CLEVELAND MODEL & SUPPLY CO.,

Designers and Manufacturers of Kits of Authentic Army, Navy and Commercial Models

Here is the Curtiss Hawk P-6E

THIS is another plane which shows clearly the trend in modern military construction. Through the use of extensive streamlining and increased power it has given considerable more performance than its predecessors. With its 675 horsepower supercharged Conqueror engine it is said to do 220 miles an hour.

The plans as they are given here are suitable for building a solid scale model, but if the builder wishes to elaborate, the best thing to do is to study photographs of the ship.

The first thing to do is to collect the following materials:

BALSA

- 10" x 2 1/8" x 1 1/2" — fuselage
- 16" x 3 1/8" x 3/8" — upper wing
- Two 6" x 2 5/8" x 5/16" — lower wings
- 5 3/8" x 2 1/4" x 3/16" — stabilizer-elevator
- 2 3/4" x 2 1/2" x 3/16" — rudder-fin

Two 2" x

- 7/8" x 7/8" pants
- 1 1/8" x 1" x 7/8" radiator block
- 2 1/8" x 3/8" x 5/16" head rest

PINE or SPRUCE

- Two 5/8" x 1/4" x 2 3/4" landing gear legs
- 5/32" x 1/16" Stock 2' long all struts
- Three 2" x 5/16" x 1/4" propeller

MISCELLANEOUS

- About 6" of 3/32" aluminum tubing exhaust stacks
- Small scraps of thin aluminum..... see article
- About 3" of 5/32" aluminum tubing for gun troughs
- Pair of 7/8" air-wheels (as soft as possible)
- One 7/16" wheel about 3/16" wide for tail
- Piece of celluloid about 1 1/2" x 5/8" for windshield
- Small amount of plastic wood for fillets

PAINT OR LAQUER

Yellow-orange, olive-drab, black, red, white, blue

TOOLS, SANDPAPER, ETC.

AWORD before we start to build. The smaller a model is, the smaller is the measurement on it representing a like distance on the real ship. The ship shown in these plans is drawn to a scale of 1/2"=1', which is quite a fair size for a solid model. However if you make a mistake of only 1/16" on your model it would be an error of an inch and a half on the real plane. So you can see why accuracy is necessary.

Complete Plans and Instructions to Build a Solid Scale Model of Uncle Sam's Greatest Fighter

By Stockton Ferris, Jr.



Notice the refinement of the lines of this latest Hawk

top view. Now here is where careful observance of cross-sections is necessary. Use templates and have them fit exactly. Notice the cowl in front of the cockpit, it has flat faces and gradually becomes curved over the motor.

The radiator is left off at the beginning as it is awkward to shape from a solid block. Make it from a separate block and set in place as shown in the side view. Another difficult point in construction is encountered at the tail. This is where the cross-section shape changes.

Notice at the leading edge of the stabilizer the fuselage has flat sides and top, with the upper corners rounded, while about 3/8" ahead of this point, it has a rounded top. A shallow groove should be cut for the exhaust stacks and holes drilled to receive them. Also holes should be made to receive the

machine gun tubes. Now is also a good time to hollow the cockpit. If a small section of the bottom of the fuselage is removed, you can work from this side also. Be sure to glue it back afterwards. The headrest is put in place now and a slot cut in the end of the fuselage to receive the stabilizer. Wherever a line denotes a seam in the cowl, score the wood with a sharp point.

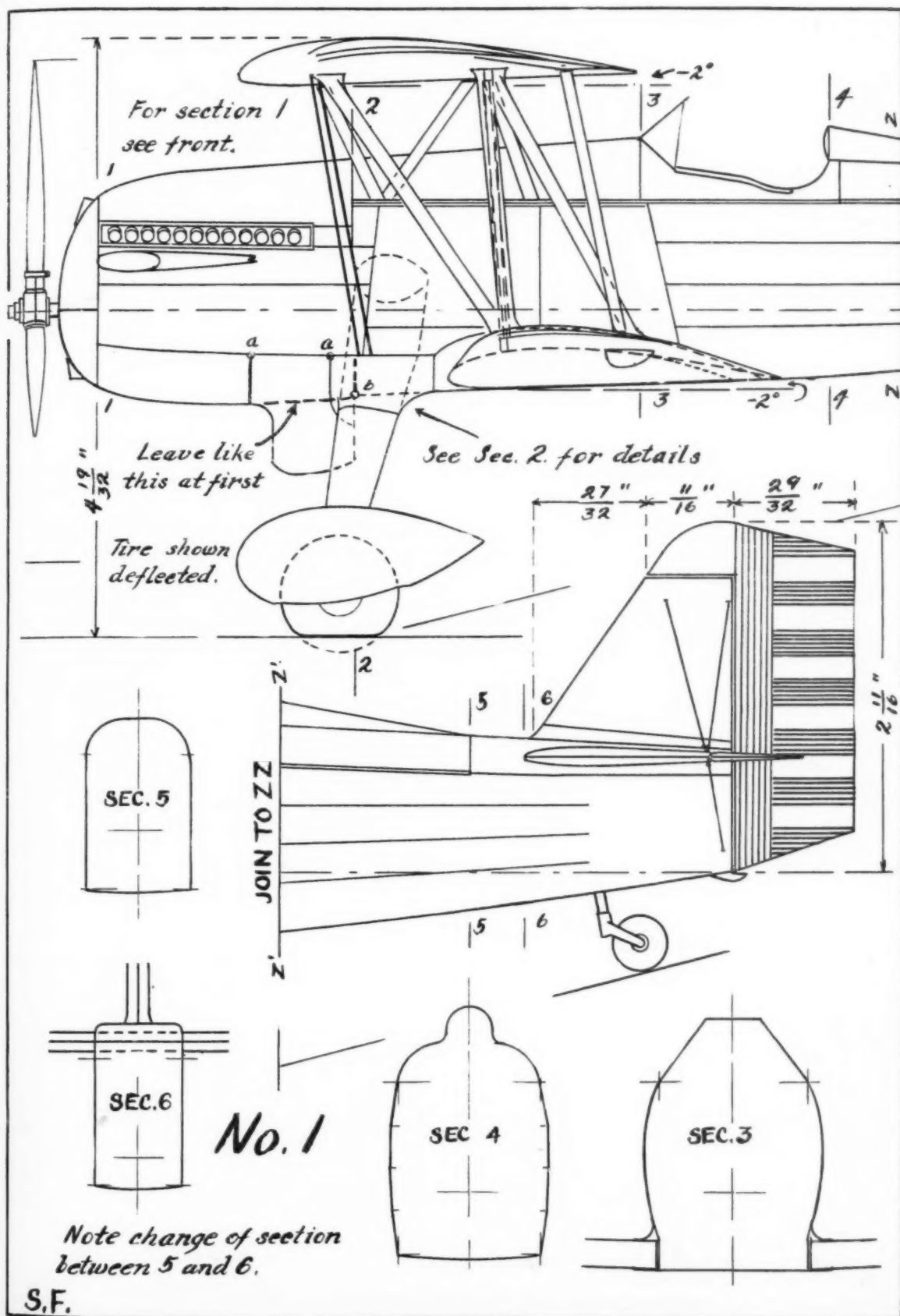
Flow on a good coat of paint and let dry while working on the wings. *Don't paint any part on which you intend to put cement or plastic wood later, as it will not hold well.*

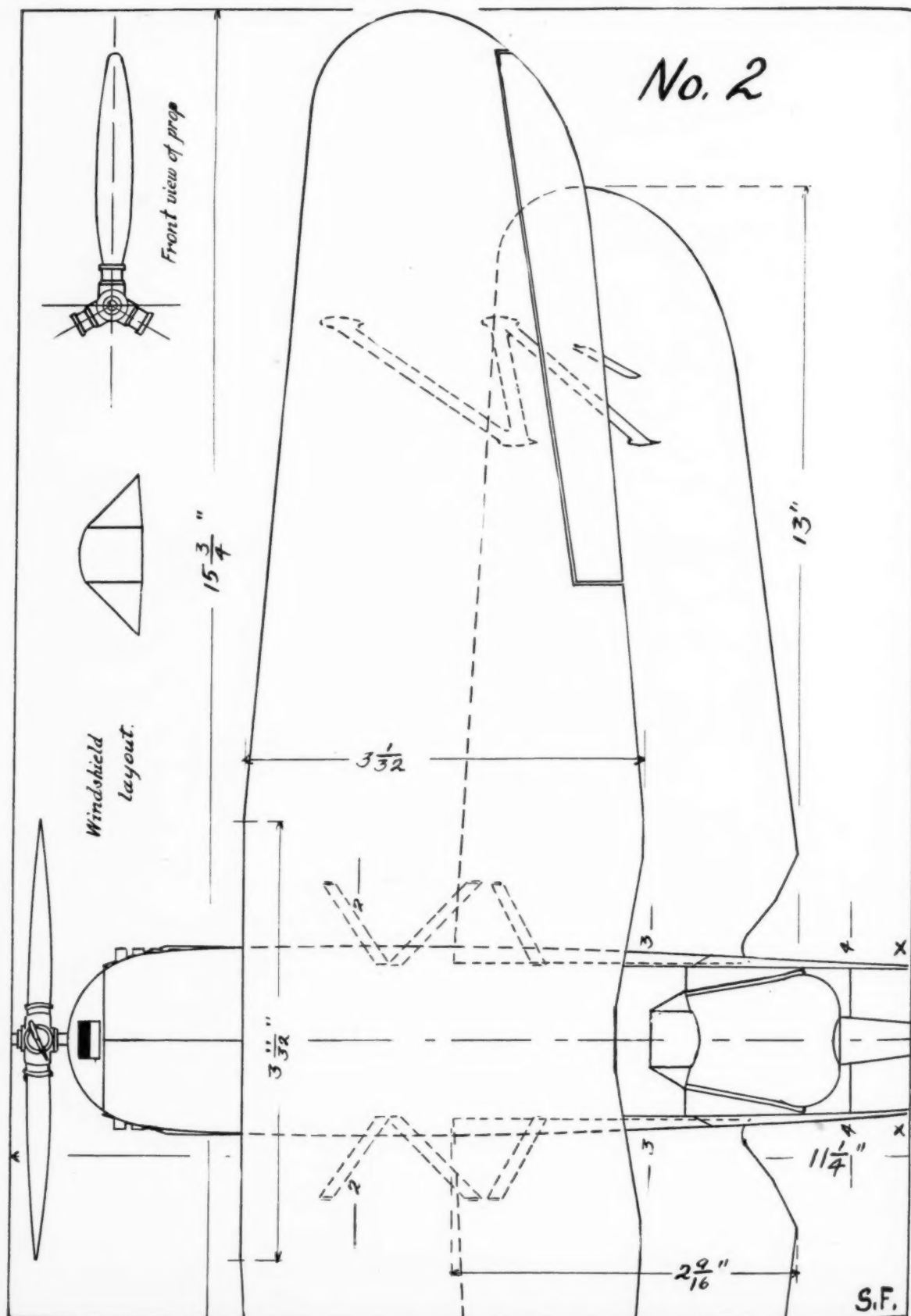
Wings and Empennage

IN making the wings, taper the blocks before trying to put in the wing section. Leave the curved tips until after the section is in. Note the small streamline aileron control horn box near tail surfaces. The control surfaces may or may not be hinged, as desired. Paint all of these parts before assembly. The wings are yellow-orange all over except for the stars (white on blue ground with red center). The stabilizer and elevator are also orange, while the fin and rudder balance are olive-drab. The rudder has red and white stripes with one vertical blue one.

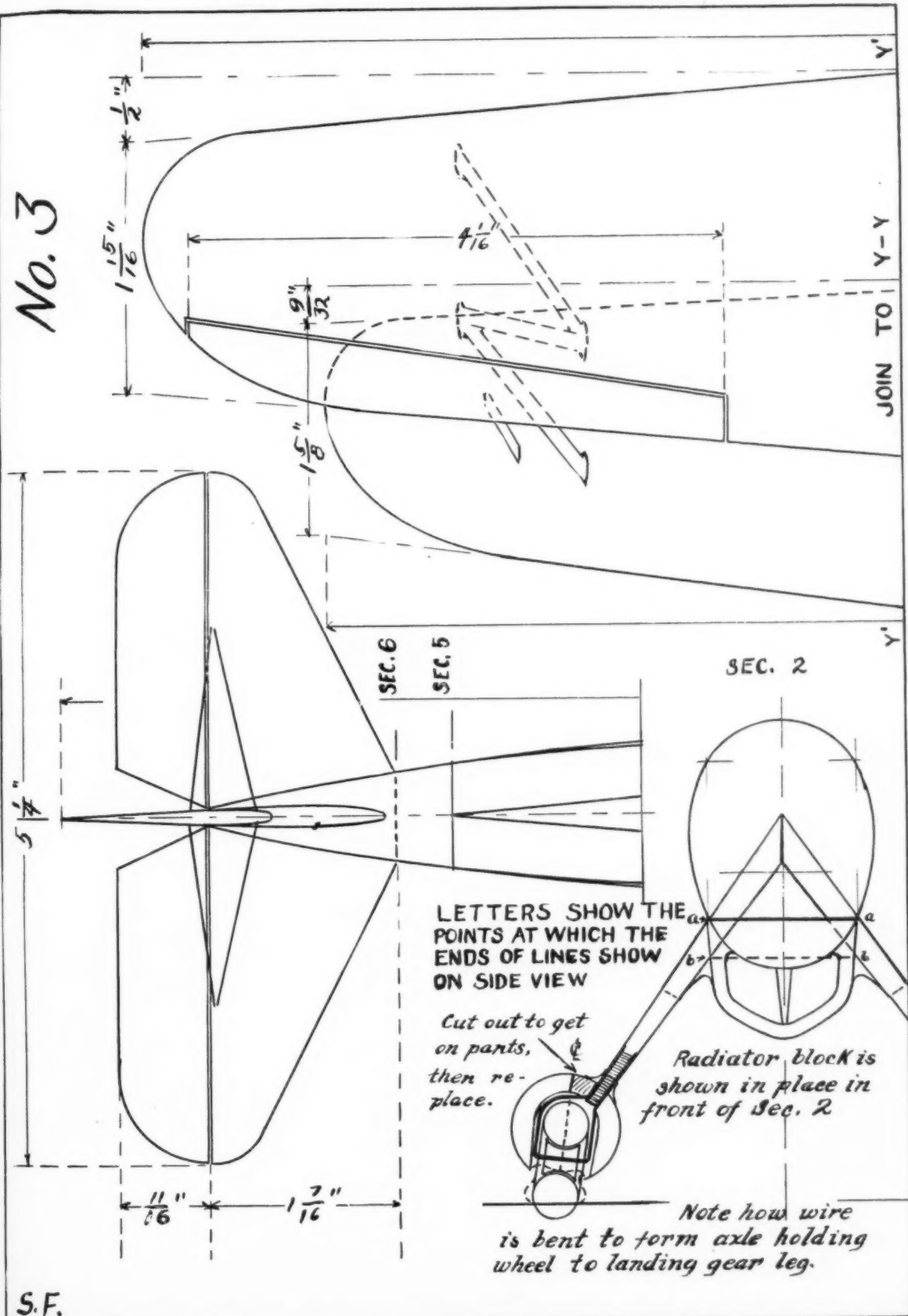
Landing Gear

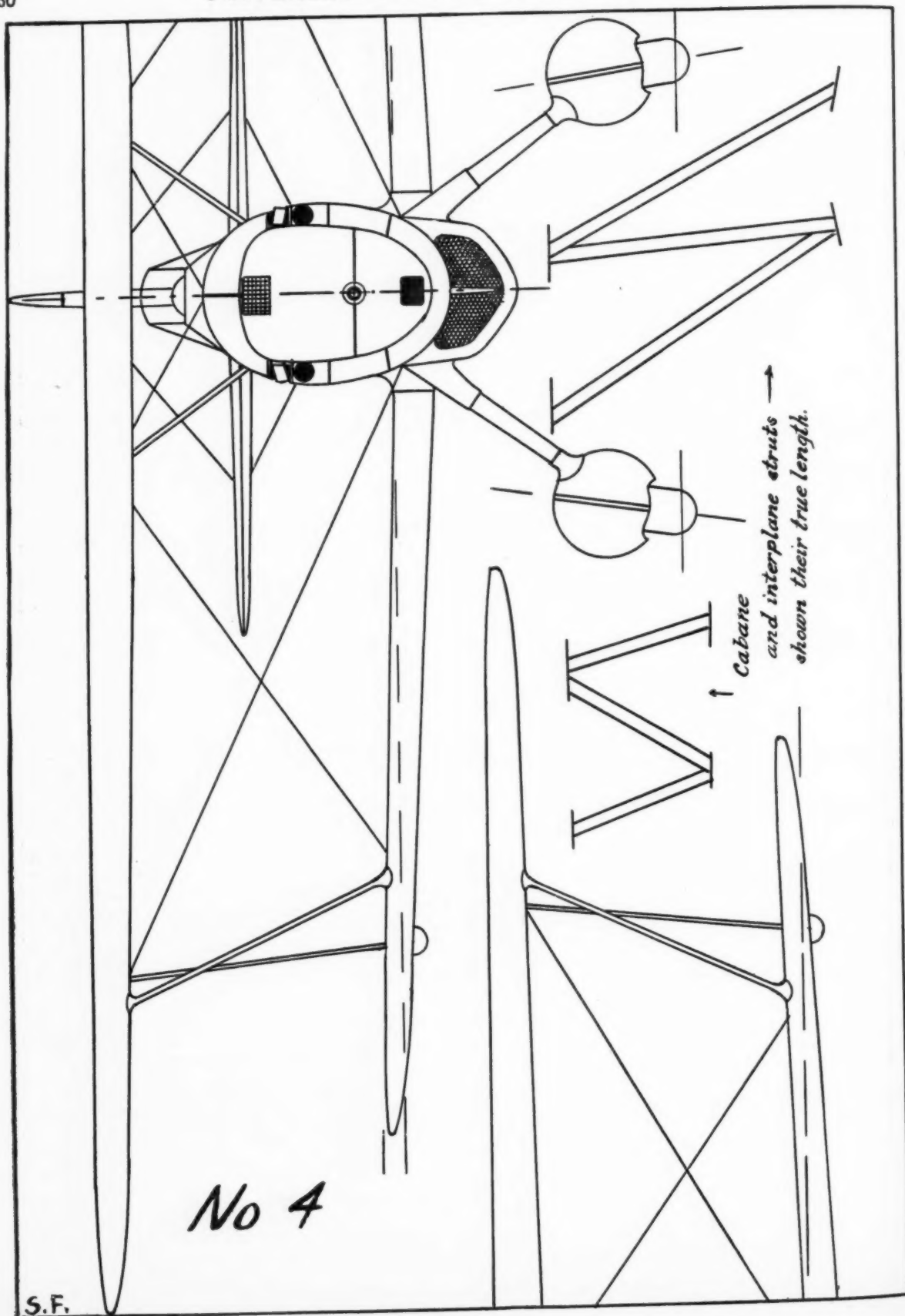
THE handiest way to make the pants is to turn them on a lathe, as they are of circular cross-section. After shaping the outside, split (Continued on page 44)





No. 3





The Aerodynamic Design of the Model Plane

Facts About Stability That Will Prevent Those Puzzling Expensive Crashes and Change Your Obstinate Models Into Real Flyers

By Charles Hampson Grant

ARTICLE No. 10

CHAPTER No. 3

SO far in our analysis of Model Airplane Design we have developed the means to lift and propel our model. Many of our young designers are able to produce planes in which these two qualities, lift and propulsion, are worked out to a very efficient degree. However, in most cases their genius stops at this point. The third and most essential factor of flight, a means of securing stability, is often a vague "something" that may exist or may not, as chance dictates. Without this quality a model plane is worthless. Regardless of how efficient the wings and propeller of a plane may be, if it cannot remain in stable flight under varying air conditions, but instead comes to the ground before the motors are unwound, the efficiency of the wing and propeller have no meaning.

In this chapter, data will be given that is the result of twenty years of independent research and which will positively cure your stability troubles if incorporated in the models you build.

First let us consider what "stability" is. It may be defined as follows. Stability is that quality that an airplane possesses when it successfully resists any tendency to displace or turn it from its normal flying attitude, or which causes an airplane to return to its normal flying attitude when once it has been displaced. In plainer words, it is that quality which keeps a model plane "right side up" or which causes it to keep or recover its balance.

There are two general types of stability, "automatic" and "inherent." The first type, automatic stability, is obtained through some mechanism that operates to keep the plane in, or return it to, its normal flight balance, because of the effect of an upsetting tendency. Inherent stability is that type which is obtained because of the permanent shape or "proportion" and distribution of weights of the airplane, without the operation of any mechanical means designed to change the relative position or attitude of the parts of the plane structure, when in flight.

Perhaps some of my readers have heard of the "Auto-

matic Pilot." When installed in a plane, this mechanism operates the "controls" to return the plane to a level flying position upon the slightest displacement from its normal flight attitude. Any such tendency is detected through the reaction of a gyroscope which in turn causes the proper controls to operate. Thus the plane is returned to its normal flying position immediately.

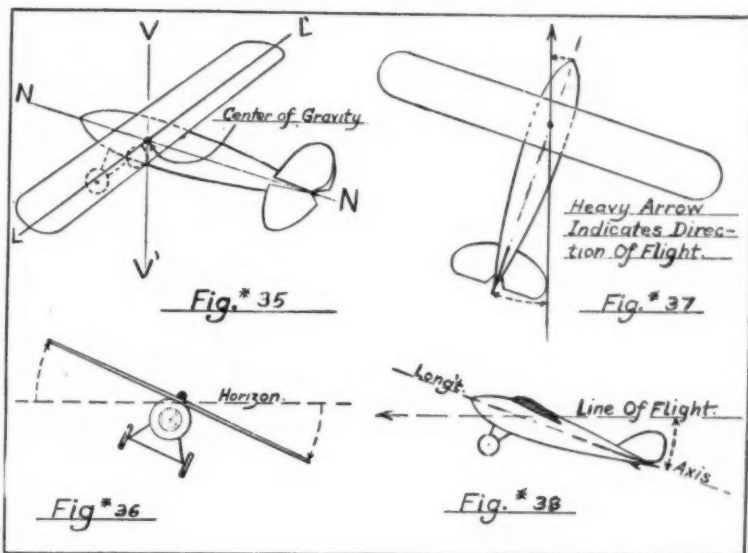
In this case stability is secured through the "control" of a mechanical device, not through the structural shape or proportion of the ship. We say therefore that it is automatically controlled.

This system is applicable to full-sized airplanes but it is not as practical a means of securing stability for models as the inherent method, in which the distribution of weights, the

shape, and the proportions of the model determine the degree of stability. This latter method requires a great deal of knowledge and experience to apply successfully. It is the best one, however, from a practical standpoint, as it does not involve the complication or weight of an auxiliary mechanical device.

SOME model designers, and many designers of full-sized ships, hold the opinion that it is impossible to build a plane that will be perfectly stable under various weather conditions. Do not let such persons discourage you, for such machines have been built, so it can be accomplished again. In fact, in this chapter and in the chapter on control, data are given that will enable you to design such a plane if you apply it correctly, a plane that will fly as if controlled directly by a human hand.

Such a plane designed by the author won the 1931 Mulvihill Trophy at Boston, Mass., against two hundred or more competitors. The wind was blowing so hard that the full-sized planes at the Boston Airport were grounded for the day, yet this model flew in perfect flight balance during all stages of the flight. The majority of the competing models cracked up because of the bad weather. After all, "the proof of the pudding is in the eating of



it" regardless of what the accepted opinions on the subject may be.

Therefore, as inherent stability is simpler and more easily applied than automatic stability, we will only consider the former type in our discussion which will follow.

Three Kinds of Stability

WHEN an automobile moves along a road, it operates in a plane. It has stability to consider in two dimensions. In the case of the airplane, however, we must consider three dimensions. There must be stability about three different axes, as follows: first, about the longitudinal axis which passes from the front to rear of the airplane, through the center of gravity (center of weight) parallel to normal line of flight, N-N Fig. No. (35). Second, the vertical axis which passes through the center of gravity, perpendicular to the longitudinal axis, and parallel to the force of gravity when the airplane is in normal flight position, V-V' Fig. No. (35). Third, the "lateral axis" which passes through the center of gravity of the airplane, perpendicular to the vertical and longitudinal axes, L-L' Fig. No. (35).

Lateral stability is that quality which an airplane may possess that causes it to resist any tendency to

roll it sideways about the longitudinal axis, or to recover its normal flight position after such a displacement has taken place. In like manner, directional stability is related to the airplane's displacement about the vertical axis and longitudinal stability about the lateral axis.

Fig. No. (36) shows a plane which has been displaced laterally. It has been tipped over sideways. If it possesses lateral stability it should right itself, returning to its normal horizontal flying position. Fig. No. (37) indicates a directional displacement of an airplane. It will return to the normal flight position if it is directionally stable.

In like manner, the plane in Fig. No. (38) has been longitudinally displaced and will return to the dotted position if it is longitudinally stable.

It must be remembered also that stability is the tendency of the plane to resist displacement from the dotted positions to any one of the positions shown by Figs. No. (36), (37) and (38).

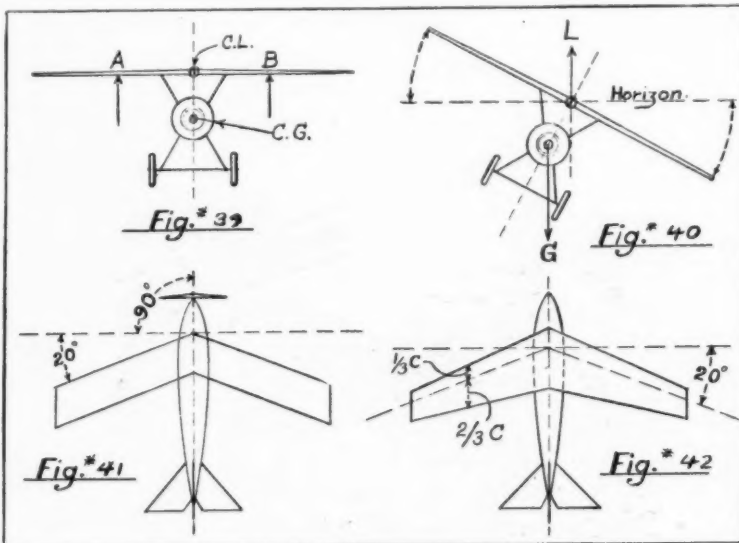
IT is interesting to note that the weights of the plane, and their remote distribution, increase its tendency to resist disturbing forces and maintain its equilibrium, and is an aid to stability in such a case. While on the other hand, when the plane has been thrown from its normal flight position, the various weights of the parts of the machine resist the stabilizing tendency and make it difficult for it to recover its balance.

The "surfaces" of the airplane have an opposite influence. They resist the displacement from normal flying position, yet also through their influence is it possible for the machine to recover its equilibrium.

In the light of these facts it would be wise to make the inertia (tendency of an object to remain in a fixed position due to its mass or weight) large, IF BY SO DOING, the plane could be made to successfully resist any disturbing force. This is not possible, however, and the inertia of a plane and its various parts makes it very difficult for the plane to regain its balance. In spite of this fact, this is the principle upon which many large-sized airplanes depend for stability. Namely, small stabilizing surfaces relative to the plane's inertia. This makes the ship steady in flight but difficult to recover from spins, stalls, etc. The pilot must have greater control over such a ship. This makes it obvious that the "principle" is not practical for models which must maintain or recover their balance by themselves without the controlling hand of the pilot. For this reason the model designer has a nice little

problem "on his hands."

The principle that must be used, therefore, to gain stability in a model is the one which involves the proper size, proportioning and relative position of the "surfaces." The position of the center of gravity and the distribution of weights relative to the surfaces, is an important consideration also. The complexities of the problem are left for discussion later on, in this chapter. It is more to the point now to show exact-



ly WHAT must be done in order to endow our model with these three types of stability, lateral, directional and longitudinal.

How to Obtain Lateral Stability

THE factors of design that contribute to the lateral stability of the model plane may be listed as follows:

First, a low center of gravity; second, the sweep back; third, the dihedral angle; and fourth, a combination of the first with either one of the last two.

Now let us get a clear conception of the meaning of each one of these and a thorough understanding of their application. When we speak of "a low center of gravity" we mean that the center of weight of the airplane, (a point, when supported at which, the airplane will remain motionless in a state of balance) is considerably below the center of lift. In figure No. (39) the arrows (A) and (B) denote the lift on the two halves of the wing. Point (CL) on a straight line connecting (A) and (B) is the "center of lift." Point (G) indicates the position of the center of gravity or weight which is below the center of lift a distance (CL-CG). We would say in this case that the model had a low center of gravity as point (CG) is considerably below point (CL). If (CG) should be located approximately at the same point as (CL) the condition of a low center of gravity would not exist. Such is often the case with low wing monoplanes.

In the search for the means of securing stability, the use of a low center of gravity was one of the first methods that presented (Continued on page 38)



Builders holding two of the larger models. The one on the right cost more than \$500 and was built by an entire class.

A Miniature Airport for Model Planes

Now You Can Follow the Example of These Los Angeles Model Builders. Build One of Your Own

By Henry Hodges

VISUALIZE a modern airport with all of the hangars, administration buildings and other equipment found in a commercial field accredited by the department of commerce, and that is what the students in the Long Beach, California, schools built recently to show the work that they are doing in school in learning aviation.

The boys had built many models of airplanes but there they were with the models on their hands and nothing to do with them. They went to work and constructed an exact scale model of the Long Beach municipal airport on the lawn of a hotel, in the heart of the city, so that everyone could see what they had done for aviation in their city. The outline of the field was laid with white tape one-half inch wide, fastened to the ground with staples. The dimensions were made as large as the lawn allowed but the plot was kept in the exact proportion of the larger field.

Prevailing wind direction was studied from government charts and the landing and take-off lanes were laid out accordingly. Two parallel lanes, one cross lane and a diagonal lane were marked with large white cord and "T" direction cards were placed at the head of each lane.

Six buildings were constructed to correspond to the units at the larger port. The U. S. Army Reserve, the U. S. Naval Reserve, standard commercial type hangars, a new hexagon hangar and an administration building and passenger terminal were made of beaver board on wooden frames.

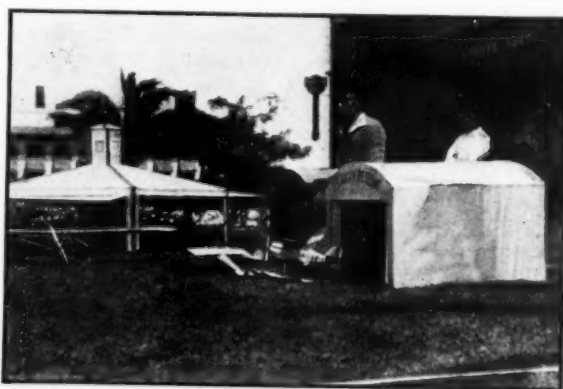
Each of these buildings was placed on the field as they ap-

peared on the real airport. In front of the passenger terminal a tunnel made of wire and drab colored canvas awaits the loading of passenger planes. On the opposite side of this building the driveways and parking spaces are laid out.

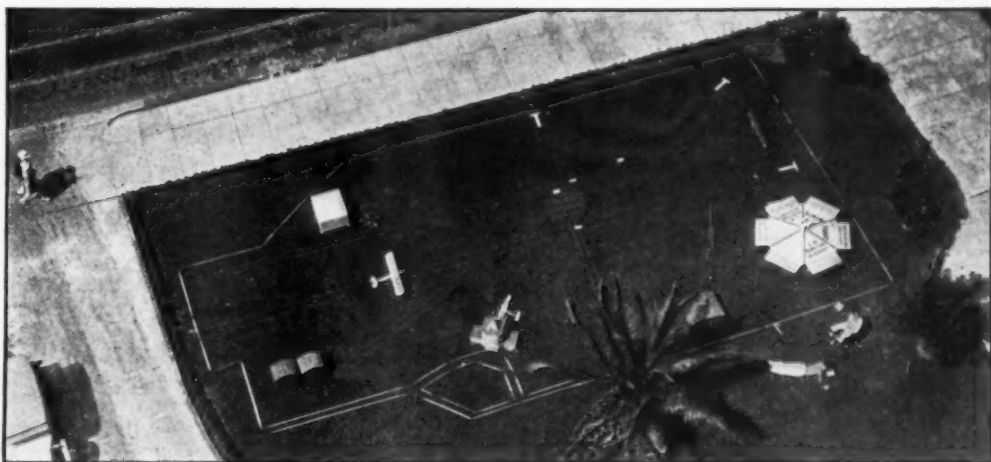
Model planes constructed by students were placed in the hangars and on the runways to depict a busy day at the municipal airport. About twenty-five models of standard commercial, army and navy types were displayed. The display was left up for one week and each day a different boy was enlisted to explain the display to passing citizens and sightseers.

Construction

IF you should desire to construct an airport such as shown in this article, it is suggested that you use the view of the airport shown in picture No. 3, as a plan. As this picture was taken from a point almost directly above the airport, the dimensions that you will get when scaling them off from the picture will be fairly accurate. This should prove to be a very interesting problem for the young airport engineer (Continued on page 45)



Army, Navy and hexagon commercial hangars shown with some of the planes.



Aerial view of miniature airport taken from 10th floor of a building

One of the Earliest Aviators

THESE pictures show a model "A" aircraft put in circulation by Mother Nature ages and ages before puny man took it into his head to gain altitude and subject his frail anatomy to nosedives, tailspins and divers other haphazard stunts. The craft in question is of the "heavier than air" type and may quite properly be called a monoplane. This particular model has undergone few, if any, changes in construction since its appearance in the dim and hoary past. It was very close to perfection from the very beginning.

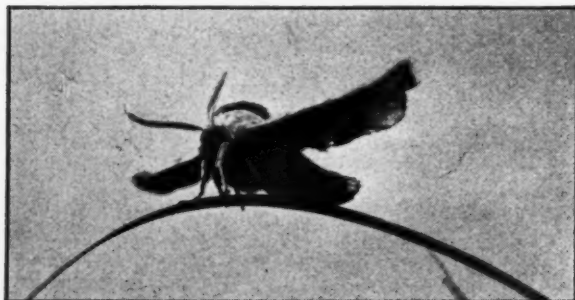
Birds have served the courageous group of human flying pioneers as models, but none, so far as is known, has ever considered it worth while to question the modest insect about his uncanny perfection in the art and technique of aviation. It seems strange that that should be so, for the lowly "bug" has not only unquestioned superiority in the art, but scats of priority as well.

Take the handsome fellow pictured here. He belongs to the noble and ancient family of Hawk moths. He can fly rings around any bird excepting none. And his ancestors? Why brother, they were on the wing doing their stuff in the air when our old Mother Earth was just a sprightly youngster and birds were still fish, and poor fish at that, maybe!!

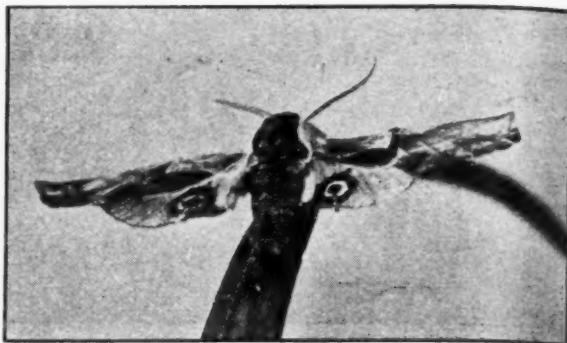
LOOK at this trim fellow! From the standpoint of engineering alone, he has any bird beaten forty ways. His build inspires ability, power, swiftness, gracefulness and you may rest assured he has all of that, and then some. Chances are he knows little or nothing else, but he DOES know his aviation, and as a navigator he has no equal anywhere. Storm, rain or fog mean nothing to him. He finds his goal no matter what the flying conditions. He always travels at a tremendous rate of speed and getting out of tight places is his specialty. Straight up or straight down backward, forward, left or right, it's all the same to him.

Here he comes, shooting toward a flower with the speed of lightning. There is no apparent slowing down, but within a small fraction of an inch of his goal, he comes to a dead stop in mid-air. Hovering gracefully before the nectar-laden blossom, he takes a sip and off he is again, so swift that the eye cannot follow.

Why not investigate the "lowly bug"? Learn some of his tricks and apply them.



Remarkable plane ready for take-off



A perfect airplane, the Hawk Moth

How You Can Bend Your Balsa Strips

WHEN making model airplanes it is sometimes necessary to make round bends in balsa or bamboo strips. These bends are hard to get true and smooth by steaming, but if they are made around a hot electric lamp, as shown, a perfect shape may be attained.



Electric lamp serves well to bend balsa strips

"Now You See It—Now You Don't"

DURING the World War, the art of camouflage had developed to a high degree. European engineers have been experimenting ever since and the accomplishments of one of them were recently demonstrated before an astounding group of foreign newspaper correspondents at Lake Garda. Here, a hydroplane, painted with the new type of camouflage, invented by an engineer in the Fiat factory, was seen to rush across the waters, to rise into the air and then to disappear completely. Everybody gasped in wonder when the plane's motor was heard approaching, then receding and finally zooming down to the water. Not until its pontoon struck the surface of Lake Garda was the plane again visible to the murmuring audience who immediately rushed to examine it. Before the foremost of the crowd arrived the mystery plane was whisked away by Italian troops who are closely guarding the latest miracle of science.

Latest Device Gives Great Speed

HARRY CAMPBELL, night mail pilot for Transcontinental & Western Air, has discovered the solution for all the problems of the air lines. An interested observer watched Campbell land his Northrop mail plane last week. "How fast do those planes fly?" asked the observer. "They have a cruising speed of 150 miles an hour and a top speed of 175 miles an hour. We carry the mail from Los Angeles to New York in 22 hours and 42 minutes," Campbell replied. "Sometimes when we have a tail wind we get the speed up to around 200 miles an hour." "Well," said the observer seriously, "why don't you equip all your planes with tail winds?"



New Curtiss Hawk that travels 200 miles per hour

Latest Hawk Travels 200 M.P.H.

HERE is the latest Curtiss Hawk. It has a top speed of over 200 miles per hour as well as an exceptional all-round performance, as indicated by tests recently conducted at Buffalo, New York, where the planes were constructed by the Curtiss Aeroplane and Motor Company. This unusual performance is primarily due to the latest 700 h.p. Wright Cyclone engine with which it is powered, to the new type Curtiss single strut landing gear, and to the clean lines of the ship.

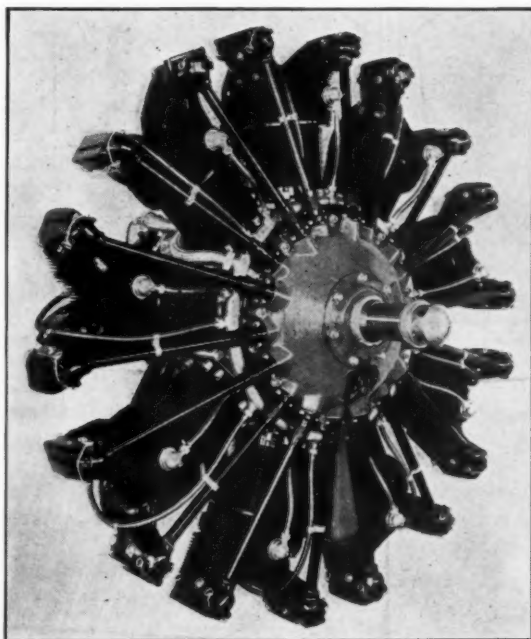
This new landing gear is a distinct improvement over the old single strut gear used in the past. As you can see from the picture, the outer part of the fairing covering the wheel is cut away so that the wheel can be removed without first detaching the fairing. Thus, all the advantages of wheel fairings may be obtained without the disadvantage experienced heretofore.

Twenty-four of these ships have been shipped recently to the Turkish government by the Curtiss-Wright Export Corporation. Mr. W. F. Goulding, Vice-President of this corporation, states that this shipment is only a part of a large aviation program being worked out by his company for the Turkish government, which includes the development of factory operations at the Turkish airplane manufacturing plant at Kayserie. Here the Curtiss Hawk Pursuit and Curtiss Fledgling Training planes will be manufactured. Technical personnel has also been furnished by the Curtiss-Wright Export Corporation to assist the Turkish government in establishing service

New Powerful Cyclone

THE accompanying photograph shows a picture of the new Wright Cyclone F engine with which this ship is equipped. This nine-cylinder engine, rated at 670 h.p. by its manufacturer, was given a rating of 700 h.p., at 1900 revolutions per minute, by the Department of Commerce.

It is also the lightest production air-cooled aviation engine in the world in weight-per-horsepower. It weighs 1.22 lbs. per horsepower. This extremely low weight is especially interesting when compared to automobile engines whose weight ranges from 10-15 lbs. per horsepower.



The latest Wright Cyclone (F) engine. It develops 700 horsepower

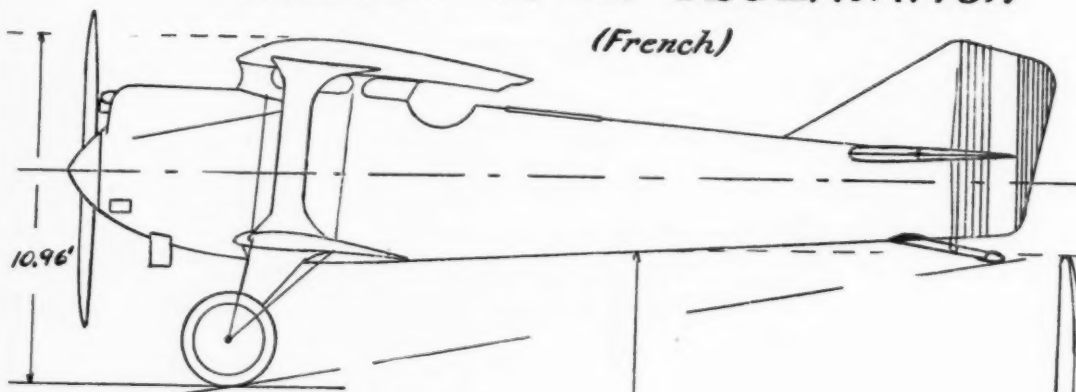
stations and giving instruction on the proper care and service of the planes and engines.

This new Hawk is extremely light for the power developed by the engine. Usually 100 horsepower will develop 500 pounds or more static thrust. Thus, 700 horsepower should develop in the neighborhood of 3500 pounds static thrust. In view of this estimate, these ships should have a climb that is nearly vertical. These facts may give rise to considerable thought upon their performance possibilities in actual combat.

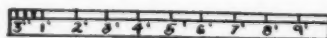
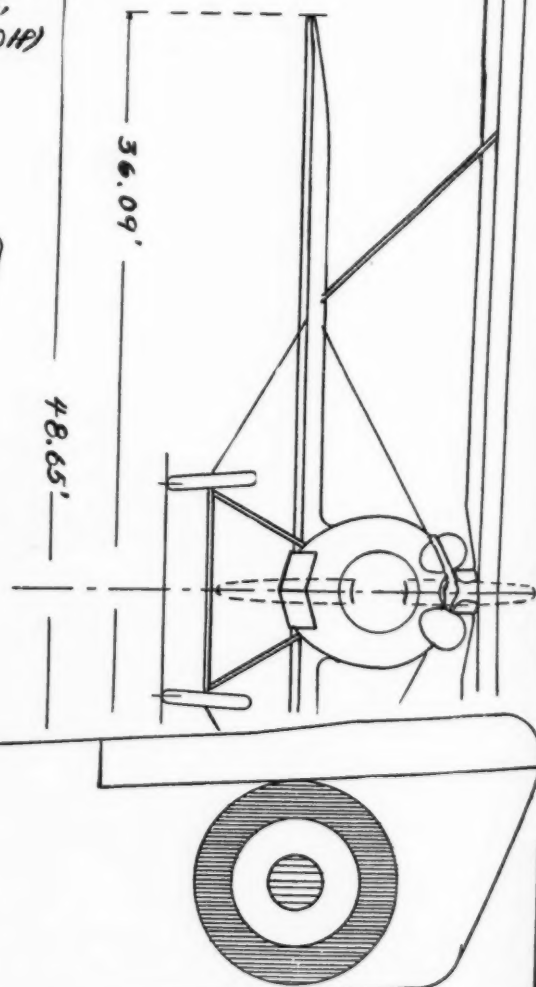
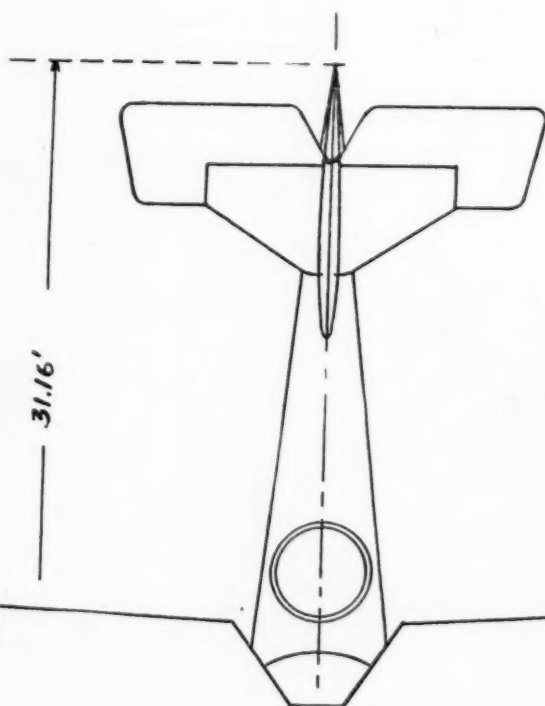
New features incorporated include a very short rigid crankshaft designed to eliminate vibration at operating crankshaft speeds, and an entirely new design of cylinder head in which is included a spark plug cooler cast as an integral part of the head which affords much more efficient cooling, thereby making it possible to obtain higher power outputs. This new Cyclone is also equipped with a large 11-inch supercharger blower compared to a 7-inch blower used in previous models. It will afford efficient supercharging without running the blower at high speeds ranging from 20,000 to 28,000 revolutions per minute as has been the

case with supercharged engines using small blowers.

The engine weighs only 10 lbs. more than its predecessor, the Cyclone E, which had a Department of Commerce rating of 575 h.p. Its diameter is 53 3/4 inches.

BREGUET 19-A2 OBSERVATION*(French)*

*Engines - Hispano-Suiza, Renault,
Lorraine-Deitrich, Farman (450-600HP)
High-speed - 135 M.P.H.*



Scale $\frac{3}{16}'' = 1'$

Stockton R. Ferris, Jr.

A Pioneer Makes Good

(Continued from page 17)

throttle and lowered the tail as the wheels left the ground. Up she went! She was in the air! Several yards above the ground, on an even keel, the whirling windmill sailed slowly across the field.

No longer did it lean weakly from side to side. It rode the air waves smoothly, easily, for some two hundred yards, before the pilot set her down lightly.

History had been made. It could go higher, the inventor knew. This was no helicopter. Its whirling rotor driven by the air only, it could attain altitude with ease. To prove it, a flight was made at an altitude of eighty feet; around the field it flew, several times, until it had covered two and a half miles in its first official flight.

Plenty of cheering then! All the world loves the successful inventor. When, years later, I stood on a field at Bryn Athyn, near Philadelphia, it was to see one of the first flying windmills brought to the United States. The smiling, cheerful, energetic inventor, son of a wealthy and prominent family, would say little about himself, but was delighted to show me his brain-child and to demonstrate it. As I watched the amazing stunts it was put through, Cierva told me of that first official flight at the Cuatro Vientos Airdrome.

Thus three solid years of hard sledding had ended in partial success. Cierva had solved his toughest problems. His machine would fly. Now to cure it of its minor "bugs." He went back to the drafting board.

HE built model after model, machine after machine—some fifty in all! The four-bladed rotor proved best. In 1924 he made his first public flight, amidst wild enthusiasm. Twenty-one years after those first unnoticed flights of the Wright brothers, people now began to realize the importance of flying—and especially, safe flying at any desired speed.

A machine built for the Spanish government was so easily controlled that it landed on a mark one yard square. And a landing was made on the deck of a vessel. Later this machine was flown in France. By this time Cierva had evolved a name. The rotor being revolved by the air only, he called his invention "Autogiro"—meaning "self-rotating." The blades never stop rotating in flight, because the air compels them to rotate.

By October, 1925, Cierva had his Autogiro so that it could rise to 1,000 feet, then descend slowly at an angle never before achieved by aircraft—about 60 degrees with the ground. In a slight breeze the pilot found that he could come straight down, about as slowly as a parachute. Spectators, especially aviators, nearly lose their lower jaws when they see that amazing exploit the first time. As I saw such landings at Bryn Athyn often, with but a few feet of run after the wheels struck the ground, I realized that it was the weight of the machine that kept the rotor turning.

By September, 1927, a cross-country flight of fifty miles was made without mishap. Cierva was computing size and strength of every part. He knew that centrifugal forces, pulling radially when the rotor turns, lessen flying stresses, permitting light blades.

(Continued on page 40)

FREE! Selley \$10.00 OFFERS TO LUCKY BOYS FOR LUCKY ORDER NUMBERS!

RULES

1. Any boy is eligible.
2. Send in an order to Selley or make your own handmade order blank.
3. The name and order number of every boy will be placed on slips of paper and thrown into a box. Once a month SELLEY will draw 50 slips. The boy whose name and number is on the first slip will receive a credit check entitling him to \$5 worth of SELLEY merchandise. (Unrestricted choice.) The boy whose number is drawn second will receive a credit check for \$2. The next three boys will get credit checks of \$1 each.
4. The names and numbers of the winners will be published in our future advertisements.
5. Orders which are received too late for this month's drawing will be eligible for next month. This contest continues until further notice.

1st Prize \$5
2nd Prize \$2
3rd Prize \$1
4th Prize \$1
5th Prize \$1

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PUSS MOTH

"THE HEART'S CONTENT"



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3" long 25c
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1 1/4" dia... 20c pr.	1" dia... 10c pr.
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1 1/2" dia... 30c pr.	3/4" or 1" Whl.
1 1/4" dia... 40c pr.	2 1/2c pr.
1 1/2" dia... 50c pr.	1 1/4" or 1 1/2" Whl.
1 1/4" dia... 60c pr.	30c pr.
1 1/2" dia... 70c pr.	Celluloid Air
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1 1/4" dia... 100c pr.	Disc Whl.
1 1/2" dia... 110c pr.	1 1/4" dia... 30c pr.
Balloon Tire	1 1/2" dia... 35c pr.
1 1/2" dia... 50c pr.	2" dia... 40c pr.
Alum. Disc	Postage on Rubber Tired Wheels 4c; Untired, 3c pr.
1 1/2" dia... 25c pr.	
1 1/4" dia... 30c pr.	
1 1/2" dia... 35c pr.	
1 1/4" dia... 40c pr.	
1 1/2" dia... 45c pr.	

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PROPELLERS CAST METAL

SPINNER TYPE STANDARD STEEL TYPE

PROPELLERS—CAST METAL			
2 bladed	3 bladed	2 bladed	3 bladed
3 1/4" 25c	4" 35c	3 1/4" 20c	4" 25c
4" 30c	4 1/4" 45c	4" 25c	4 1/4" 35c
4 1/4" 35c	4 1/2" 50c	4 1/4" 30c	4 1/2" 40c
5" 40c	5 1/4" 60c	5" 35c	5 1/4" 50c
5 1/4" 45c	5 1/2" 70c	5 1/4" 40c	5 1/2" 60c
6" 50c	6 1/4" 80c	6" 45c	6 1/4" 70c
6 1/4" 55c	6 1/2" 90c	6 1/4" 50c	6 1/2" 80c
7" 60c	7 1/4" 1.00	7" 55c	7 1/4" 90c
7 1/4" 65c	7 1/2" 1.10	7 1/4" 60c	7 1/2" 1.00
8" 70c	8 1/4" 1.25	8" 65c	8 1/4" 1.10
8 1/4" 75c	8 1/2" 1.40	8 1/4" 70c	8 1/2" 1.25
9" 80c	9 1/4" 1.50	9" 75c	9 1/4" 1.40
9 1/4" 85c	9 1/2" 1.60	9 1/4" 80c	9 1/2" 1.50
10" 90c	10 1/4" 1.75	10" 85c	10 1/4" 1.60
10 1/4" 95c	10 1/2" 1.85	10 1/4" 90c	10 1/2" 1.75
11" 1.00	11 1/4" 1.95	11" 95c	11 1/4" 1.85
11 1/4" 1.05	11 1/2" 2.05	11 1/4" 1.00	11 1/2" 1.95
12" 1.10	12 1/4" 2.15	12" 1.05	12 1/4" 2.05

The following sizes are supplied with adjustable blades with special hub, clamping rings and safety screws.

13" \$5.00 15" \$7.00 17" \$5.00 19" \$6.00
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28" 9.00 29" 11.00 30" 8.00 31" 9.00

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Diameter	Anti-Drag	Open Cowl	Closed Cowl
1 1/2"20	.20	.20
2"25	.25	.25
2 1/2"26	.30	.30
3"30	.35	.35
3 1/2"40	.45	.45
4"50	.55	.55
4 1/2"75	.80	.75
5"80	.85	.80
5 1/2"	1.05	1.10	1.05
6"	1.25	1.30	1.25
6 1/2"	1.50	1.60	1.50
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The Open Road for Boys is a 50-page magazine publishing sparkling stories of air adventure, sport stories, articles by famous coaches and star athletes; adventure stories of the barren wastes of the Arctic, of the wild jungles of the Tropics, of the battlefields of the World War, of the cow towns of the Old West, and of the mysterious lands of the Far East; business stories, school stories and many others. In addition four great serials each worth \$2.00 in book form. World-wide correspondence club, stamps, OPEN ROAD PIONEER CLUB, best dope on hunting, fishing, camping. Contests galore, with plenty of prize money. Red-blooded stories for red-blooded HE boys.

Aerodynamic Design

(Continued from page 32)

itself. It is evident that if the airplane should be tipped over sideways as in Fig. No. (40) the weight of the plane (G) would have a tendency to swing as would a pendulum and bring the machine back to its normal horizontal flight attitude. The farther G is below the center of lift, the greater will be the righting effect.

However the righting effect is not sufficient to cause satisfactory lateral stability in all cases, and therefore this method is usually used in conjunction with other means. A model embodying this method alone will insure stable flights when air conditions are right but cannot be depended upon to act as a proper means of stability in all kinds of weather.

To secure the best results, design your model so the Center of Weight is as low as possible. If it is carefully designed, the results may be perfectly satisfactory. The center of weight should be below the center of lift, at least a distance amounting to five per cent of the wing span. If the span of your model is 25 inches, the distance (CG-CL) Fig. No. (39) should not be less than (1 1/4) inches.

Sweep Back

A FORM of wing design, known as the "Sweep Back" is also effective when it is used as a means of obtaining lateral stability. The name originates from the fact that in the practical application of this method the wings are constructed in the form of a wide "V" horizontally disposed. The apex of the "V" is formed by the intersection of the leading edges of the two halves of the wing, which slant backward from the nose of the ship in a horizontal plane. The two wings, right and left, form the legs of the "V." Fig. No. (41) shows the plan view of a wing with a sweep back.

The effect of this type of design is to "right" the airplane when it has been tipped over sideways from a horizontal position. However, a swept back wing is not as efficient as a straight one, and ALSO CAUSES THE PLANE TO HAVE A TENDENCY TO "SPIN" upon slight provocation.

If the amount of sweep back is small, this effect may not be produced but the stabilizing effect will be often insufficient. It is possible to have such a model fly properly under good weather conditions, but it is not always satisfactory as far as consistently good flights in all kinds of weather are concerned. However, it serves as an interesting experiment for the model designer.

Amount of Sweep Back

THE amount of sweep back varies from 10 degrees to 30 degrees. The less that can be used and yet retain a sufficient amount of lateral stability, the better. Twenty degrees is usually sufficient for the average model with a high center of gravity; that is usually in cases in which the line of thrust is close up under or just over the wing center section. This means that each wing slants backward at an angle of twenty degrees to the lateral axis of the machine, or to a line drawn through the apex of the "V" formed by the wings, and

(Continued on page 45)

Flying the Front

(Continued from page 7)

across the lines. Wild, stolen forays into the war game they were soon to know so well!

EVENTUALLY, our Flight Commanders offered these French and British units the use of our pilots. They were accepted cordially and initiated into the grim art of fighting in the clouds. Americans were soon flying Spads and Nieuports with the French, and Camels or S.E.-5s with the British.

Ingalls, along with several other members of the Northern Bombing Groups, was loaned to the British Squadron No. 213. Except for a short time when he was ordered back to Dunkirk to work with the Navy group there, he continued until the end of the war with this British outfit. At first, he flew Camel seaplanes but later the squadron was equipped with landplanes which gave them better odds with the Germans in dog-fighting.

The young American's first redoubtable exploit came when he was separated from his patrol during a flight. At first, his sensation at finding himself a lone airman back of the enemy lines, was not a happy one. But when the initial strangeness had worn off, he relished the idea of being able to do some stalking on his own. Presently, he discovered a German two-seater busily engaged in directing artillery fire. Taking a quick survey to be sure the planes did not have an escort of Fokkers in a position to dive on him from above, Ingalls pointed his craft down towards the German and with full throttle, descended upon him.

A spatter of bullets from Ingalls' gun was the first warning the enemy pilot received. He was quick and experienced, and in spite of Ingalls' daring attack, managed to get his craft turned around and headed for home. Ingalls followed, determined not to lose his prey. Somewhere in the back of the young American's mind the thought that he was being drawn further and further into enemy territory may have occurred. If so, he ignored it. For months he had been awaiting this moment and no amount of cautious reasoning could have induced him to give it up.

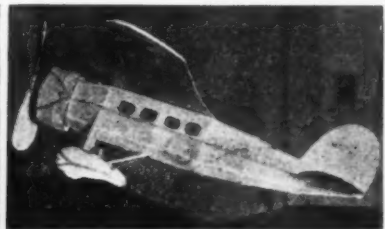
On they roared, zigzagging through the sky, pursuer and pursued. Giving his tiny scout all she could take in one final burst of speed, Ingalls came close enough to the other plane to direct carefully a few bursts of gunfire. Suddenly a puff of black smoke emerged from the German followed by tongues of flame until the craft was a flaming comet headed for the ground and destruction. The youngster who had dreamed, at Yale, of fighting his country's battles in the sky, was on his way to becoming an ace.

Shortly after this, Ingalls' squadron engaged in a daring and clever maneuver. Daylight had not yet streaked the sky and their field was still shrouded in darkness when they took off on a secret flight. Up, up, they climbed until the air about them had a numbing chill and far over the edge of the horizon they could see the golden fingers of the sun. Below, all was dark. When they had reached the altitude agreed upon for their rendezvous, they fell into V formation and with their engines shut off started a long, silent, ominous glide into enemy territory.

(Continued on page 43)

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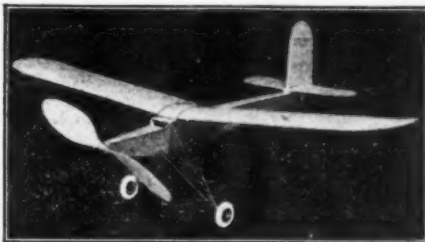
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Capt. Mollison's PUSS MOTH*"The Heart's Content"*

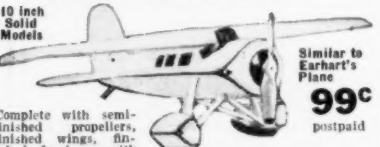
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A Pioneer Makes Good*(Continued from page 37)*

The British Air Ministry, designing its first machine, had to learn anew the lesson of flexibility in blades. Its engineers insisted upon stiffer and more rigid blades. Two hundred feet up two blades gave way with a loud crack. Down, down the machine came. The force of the hard landing, made partly on a wooden structure, tipped the machine over and drove the undercarriage clear through the fuselage.

But the pilot stepped out with nothing worse than bruises. This was safety proved. Several Autogiros were ordered—with flexible wings. And by now the young inventor was so confident that he began to fly his machines himself, though he had never become a pilot. He made no flights of distance, till suddenly he resolved to make a real trip.

So on September 18, 1928, with a French editor as passenger, he took off from England, heading out across the English Channel. It was rather nervy for the Channel was rough, as was the air. A landing would have been fatal. At nearly a hundred miles an hour—top speed had been increasing—they whirled above the whitecaps.

The machine seemed to smooth out the air bumps. Soon they were across. Cierva picked up a railroad and followed it to historic Le Bourget field, near Paris. It was not long after Lindbergh's famous flight. Tens of thousands raised their voices and eyes to the sky as the pilot cut his motor, several thousand feet up, and floated down "like a maple leaf drifting leisurely earthward."

Two days later an American reporter was "taken for a ride," and a surprising one. Taxiing over the field, they felt a jar. They took off and made a few turns. The landing was anything but gentle. The reporter heard something crack. The left wing snapped off as the wheel sank down. Two blades were clipped off. A third dangled. The fourth dug itself in and supported the ship. The prop was clipped.

The shaken reporter and the pilot climbed out. They learned that a cable on the landing gear had struck a stake and broken, weakening the left wheel. Cierva had guessed the trouble at once. The reporter telegraphed his story, pointing out that such a landing with a fixed wing plane "would surely have resulted in splinters and possible explosion." Neither Cierva nor the reporter was injured in the least. In a few days the machine was whirling again. Around the British Isles and the Continent it whirled, 3,000 miles without trouble.

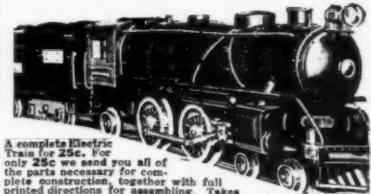
LATE in 1928, Harold Pitcairn brought an Autogiro to the United States and took over all rights in this country. He developed a clutch to utilize the motor for bringing up the rotor to 120-150 r.p.m. in about half a minute. Thereafter the rotor turns freely in the air.

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*(Continued on page 42)***DIRIGIBLE 25c**

Complete DIRIGIBLE for only 25c. All ready to blow up. Ready to fly three minutes after received. Nothing to construct or build. Three-blade propeller all ready made. Flies in or out of doors. Sixteen inches long. Modeled after Army dirigibles. Zooms and maneuvers. Many exciting stunts can be performed. Complete, nothing more to pay or buy, 25c. Five for \$1.00, postpaid.

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AAA Balsa Wood

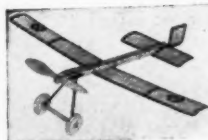
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1/16x2 (03)	x3 (05)	x4 (10)	1x3x24	20	x36 32
1/8 x2 (04)	x3 (06)	x4 (10)	2x3x24	30	x36 40
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1/32x1 7/8	15 for 05	1/16x6	01	1x1x1/2	07
1/16x1 1/2	15 for 05	1/8x8	02	1x1x1/4	06
1/16x1 1/8	15 for 05	1/4x1x8	03	1x2x10	08
1/16x1 1/4	15 for 05	1/4x1x10	04	1x2x12	10
3/32x3 3/2	15 for 05	1/4x1x12	05	1x2x14	10
			TISSUE PAPER—CEMENT		
1/8x1 1/8	15 for 05	20x24	White Hakone	09	
1/8x1 1/4	10 for 05	21x31	Mino Silk	03	
3/16x3 1/6	10 for 05	18x24	Superline	05	
3/16x1 1/4	5 for 05	Cement	(large tube, clear)		
1/4x1 1/4	5 for 05	Super Seal			

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INTERESTING NEWS

about where to buy models, supplies and bargains of all sorts is printed in the Classified Directory on page 48

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Not a Construction set, but a real Airplane!

This crash-proof 14-inch B. O. G., worth a dollar in any store, only 25c, or 5 for \$1.00! Rises of ground, flies 50 to 200 feet or more. Positively guaranteed to fly. Made of best materials: silk tissue, Japanese poplar, balsa, duralumin, etc. Weighs 1/2 ounce. Agents wanted. No catalog.

Read What Others Say:

"Your Dragon-Fly certainly does ride these Montana breezes. I have had several 500-foot flights with mine."

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"The Dragon-Fly is in a class by itself—I have never found anything near it in performance or workmanship."

"—flies perfectly and does everything you claim for it."

Send for Yours Today!

WESTERN AIRCRAFT MFG. CO.

4135 W. Pico

Los Angeles, Calif.

Advisory Board

(Continued from page 19)

attack that gives the greatest lift is usually about 15 degrees. The most efficient angle of attack is between 4 and 6 degrees. There may be exceptions to this rule in the case of airfoils of unusual design.

Question. Please explain how and why a surface added to the underside of an r.o.g. wing would change the lift?

Answer. By r.o.g. wing, I am taking it that you mean a single surfaced airfoil. By adding a surface to the underside, the total effective camber of the wing is reduced. Thus, the lift of the wing at the same speed is less than is originally the case. However, when a surface is added to the underside, a much more efficient airfoil is the result. Therefore, with the same power, the machine will fly very much faster. Due to the added efficiency of the wing and to the greater speed, this double surfaced wing will give more lift than the original single surfaced airfoil, with the same power. Summing up briefly, by using a double surfaced airfoil, greater lift and greater speed may be obtained.

HERE are some questions from Clyde Cook of Burlingame, Calif. It looks as if he intended to get into the flying game in a serious way; if he isn't in it already.

Question. Is it possible for a private pilot to become an instructor of flying?

Answer. Anything is possible provided the person has enough determination. It

will be necessary for the private pilot to pass an examination for transport pilot and then go out and land a job as instructor.

Question. How long does the average airplane last?

Answer. This depends upon so many varying factors that it is impossible to determine the average life of an airplane in general. If you are speaking of transport airplanes, that is one thing; military airplanes, that is another; and commercial airplanes, flown by private individuals, that is still another. The life of an airplane, I should say, depends upon the intelligence of the flyer and how carefully he operates his ship.

Question. Are air bumps close to the ground dangerous to airplanes?

Answer. The air bumps themselves do very little damage to the ship. It is the sudden contact with terra firma that often results in kindling wood, or should I say, twisted metal. Seriously speaking, however, air bumps close to the ground are usually not dangerous to airplanes when the ship is flown by a competent pilot, who takes into account the possibility of air bumps being located at any specific point. Down drafts have caused many pilots to lose altitude upon the takeoff, thus preventing them from clearing telephone wires, trees, etc., at the end of the field, with disastrous results. Therefore, we might say that fields should be long enough to insure against the possibility of such an event taking place. The most dangerous period in the

flight of an airplane occurs at the takeoff and during the first few moments when the ship is climbing. The loss of support at this time causes the machine to drop or to turn over sideways. When it is in such a position, the pilot cannot readily return it to proper balance and flying speed.

J. L. Carr of Dennison Avenue, East, Toronto, Ontario, asks:

Question. Which airfoil is better to use for a low-wing sport model, a U.S.A. 35A, or a Göttingen 387? With the U.S.A. 35A I would sacrifice speed, but with the 387 I would get a fair amount of lift and more speed. (Editor's note: These two sections appear on page 28 of the March, 1932, issue of MODEL AIRPLANE NEWS.)

Answer. I would use the Göttingen 387 because it gives a reasonable amount of lift, yet will require less propeller blade area to fly your model properly than the U.S.A. 35A. If the 35A is used, the amount of propeller blade area will necessitate your propeller being extremely large in proportion to the wing. This will make your model look distorted. If a small propeller is used in order that the model have proper eye proportion it will be entirely too small to fly the model correctly. With the Göttingen 387, a smaller propeller may be used and yet retain the proper performance.

Question. In a tapered wing, should the leading edge taper as much, less, or more than the trailing edge?

Answer. What you should do in this case depends entirely upon the effect that you

(Continued on page 44)

FALCON ADVANCED MODELS hold the distinction



MONOCOUPÉ 110

MONOCOUPÉ FEATURES

Prime Mover—Cell. Dummy Motor—Spun Aluminum Ring—Aluminum Cowl Plate—Cell. Balloon-type Wheels—Special Model Airplane Color
Winner of many National Air Race events. The model is a natural record-breaker without the prime mover, but with this marvelous device its performance is practically doubled. Kit for this 18" wing span model contains, besides the special features named, full size detailed drawing, large folder of instructions, and generous supply of material. Kit postpaid **\$1.95**

of being the most complete ever offered. The reason? We include, besides plenty of grade A material, every known feature and device to make our models the most beautiful and best flying on the market. (Notice Monocoupe features.)

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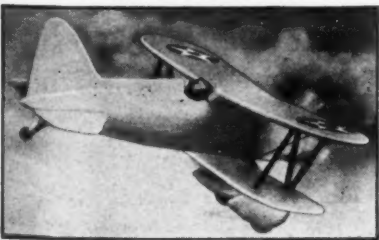


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Akron Fighter	Hawker Fury
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MODELS ARE 6" TO 8" SPAN IN
PROPORTION TO SCALE



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BUILT ENTIRELY FROM KIT NO. AC-8

These are the most complete kits you will ever have the pleasure of working from. They contain absolutely everything you will need, including such features as fully printed balsa parts, stamped fuselage block, correct insignias, and plenty of our brilliantly colored dopes, besides all the other parts needed to make a model that will look just like the real thing.

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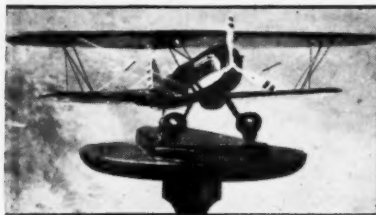


PHOTO OF A STOCK HAWK MODEL
TRUE SCALE ORNAMENTAL MODELS
BEAUTIFUL 20" fine detailed, true scale models of the CURTISS HAWK P-6-E and FALCON AC-3. These models are authentic miniature reproductions of the prototype, carefully designed and constructed to bring out the finest detail. Each an art-piece of rare beauty and distinction.

The wings and control surfaces are of specially treated, polished balsa, with natural rib markings. Fuselage of bamboo dowl framework, covered with a glossy drum-tight covering. Cowling: are also of polished balsa. Many little features, such as a dummy instrument board, radiator shutters, scalloped trailing edge of the wings, etc., give these models a most realistic appearance. The super-streamline of the Hawk's landing gear, radiator and wing fairings is carried out to the finest detail. The entire model is carefully hand finished in special gloss lacquers.

These models are unconditionally guaranteed to be exactly as represented.

CONSTRUCTION KITS are unusually complete, including all necessary material, balsa wood, bamboo, large quantity of dope for finishing the wood, cement, fairing filler, special gloss lacquers in yellow-brown, red-white-blue, silver, etc., covering material, music wire, special cockpit lining braid, instrument boards, wheels, etc. pins. Also a detailed three-view, full-size drawing, pattern layout, and full instructions.

Completely finished, Curtiss Hawk P-6-E, with base-board, \$21.50 each; completely finished, Curtiss Falcon AC-3, with base-board, \$20.00 each; Curtiss Hawk P-6-E Construction Kit, complete, \$3.50 each; Curtiss Falcon AC-3 Construction Kit, complete, \$3.25 each.

Full size, detailed three-view drawing, either model (prepaid), 50¢ each; full size, pattern layout, either model (prepaid), 50¢ each.

SPECIAL PRICES TO DEALERS

Photographs, 10¢ each. Descriptive folder free upon request.

Please remit by Money Order or check. Stamps and foreign coin not acceptable. C.O.D. orders accepted if accompanied by 25% full cost.

VICTOR STANZEL, Schenectady, Texas

A Pioneer Makes Good

(Continued from page 40)

After twelve years of unremitting toil Cierva has produced at last a machine which attains an air-speed as great as one hundred miles an hour, while the landing speed is little or nothing: has produced a non-stalling machine, with controls always effective.

Recently a man jumped from a plane with a parachute; alongside was an Autogiro, in which the engine was stopped. Side by side the man and Autogiro floated earthward. The machine was last to reach the ground. Landings have been made on docks, even large lots, streets and highways, and take-offs also. Perhaps future villages will have community plots for commuters' landings and take-offs. Huge transports, aerial taxis, hovering bombers, ambulances, exploring craft, have all been built or are planned for the future.

Autogiros have sought jungle-covered Maya ruins, have flown from coast to coast, have been used for taking photographs, news gathering, army and navy tests, traffic study. Amelia Earhart flew one to 18,000 feet; W. T. Campbell, at Boston, to 22,000 feet. Windmill planes have delivered mail to steamers, found big game and lost flyers. On October 13, 1931, one was looped without difficulty.

Thomas A. Edison, near the end of his career as the world's greatest inventor, visited Newark Airport to see an Autogiro flown.

"Flexible! That's the trick," he said, feeling the blades. "That's the only way to avoid gyroscopic action."

James G. Ray, pilot, fluttered to a landing without forward roll. The aged inventor gasped.

"By gosh!" he exclaimed, "you have them so now that they'll do anything but chew tobacco!"

Always skeptical, he had the landing repeated. He was convinced.

"That's the answer!" he cried, with all the enthusiasm of the boy he had always been. "That's the answer! That's the kind of planes we've got to have."

Be that as it may, that young engineer has brought a new principle to aviation. As President Hoover said, when presenting the Collier Trophy to Mr. Pitcairn and his engineers:

"Its ability to rise and descend with safety almost vertically makes it a practical and decided step forward."

The Autogiro is the only plane that ever made a landing and a take-off on the White House lawn. Perhaps the day is not far distant when it will land and take off on every man's lawn.

How Well Do You Know Your Airplanes

(Continued from page 8)

97th Street, New York City.

These first two young men had perfect entries. Gigante, however, made a very minor mistake in the designation of the Boeing P12B.

We will be very pleased to hear from any of the winners. They will receive their awards very shortly.

V-I-C-T-O-R-Y Broadcasting

far and wide to all air-minded boys and girls. New "Holiday" Prices—make an ideal gift at a great saving. "Build a Plane."

Balsa Wood Grade AAA
36" LENGTHS

Strips		Sheets	
1/16 x 1/16.....	13 for \$.05	1/32 x 2.....	2 for \$.07
1/16 x 1/8.....	12 for .05	1/16 x 2.....	2 for .07
1/16 x 3/16.....	10 for .05	1/16 x 3.....	2 for .15
3/32 x 3/32.....	10 for .05	3/32 x 2.....	2 for .09
1/8 x 1/8.....	10 for .05	1/8 x 2.....	2 for .09
1/8 x 3/16.....	7 for .05	1/8 x 3.....	2 for .19
1/8 x 1/4.....	7 for .05	3/16 x 2.....	2 for .13
1/4 x 1/4.....	3 for .05	3/16 x 3.....	2 for .22
1/2 x 1/2.....	3 for .14	1/4 x 2.....	2 for .15
1 x 1.....	2 for .14	1/4 x 3.....	2 for .25
1 x 1.....	2 for .22		
Balsa Planks		Colorless cement.....	
1 x 3.....	\$.30	2 oz.....	\$.10
1 x 2.....	.40	Clear dope.....	2 oz. .08
1 x 3.....	.40	Colored dope.....	2 oz. .10
1 x 4.....	.50	Banana oil.....	2 oz. .08
1 x 6.....	.80	Acetone.....	2 oz. .05
		Wire, all sizes.....	1 ft. .01

And many other wonderful buys—prop blocks, Bamboo, red, covering materials, celluloid wheels, etc.

Kit, complete, 20" wing spread \$5.55 P.P.

Write for details

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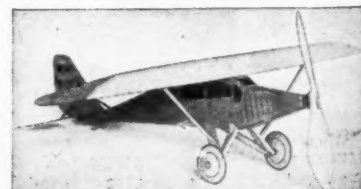
the December issue of UNIVERSAL MODEL AIRPLANE NEWS. Besides the regular features about model flying, model club news, War aces, air mail stamps, answers to questions about aviation, and prize contests, December issue will carry not less than SIX Model Plans and Articles. Here's the list, you'll want to build every one:

New Heath Parasol
Page-Nancy Rour
Widell-Williams Rour
Howards IKE
Stratasphere Plane
War-Time Fighter

December issue will be out on the news-stands December 1. Be sure to get your copy—15c.

Or make it absolutely certain that you won't miss the December or any other issue by sending in \$1.65 now for your year's subscription.

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New construction makes this the easiest and quickest built model on the market. It is more than a toy; it embodies scientific principles used in all modern aeronautical engineering. It flies great, too! See its New Prop—a new high lift wing and many other new features. To introduce this craft we offer the complete kit with fully illustrated instructions for.....

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15¢
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Flying the Front

(Continued from page 39)

WHAT an experience this was for the American lad who, in spite of having brought down his first plane, was still a novice. Dawn was breaking; the sky was coldly gray. Like great hawks whirling down on their prey, were the shapes of his companion planes. The accustomed cheerful roar of the machines, which is music to an aviator's ears, was gone. The only sound was the eerie whine of the wires.

In back of them they could hear the guns of the front line. Ahead, dimly discernible through the morning mist, were a few glimmering, incautious lights. There was their destination. Lying tranquilly below them was the enemy airdrome at Varsenaere where the Germans considered themselves far enough back of the lines to be fairly safe.

The leader raised his hand. The signal they had agreed upon back at the headquarters of No. 213! Opening wide their throats, they dived full upon the sleeping camp, letting loose a hail of bombs and machine guns. Men fled in every direction and when they at last turned back to their base, the Squadron had the satisfaction of knowing that their repeated dives, each one bringing a new rain of bombs and machine gun bullets, had done considerable damage to German hangars and planes. For his work in this raid, Ingalls was made a Flight Commander.

Scarcely a month later while leading a section of five Camels in a twenty-plane formation, he attacked the airdrome at Uytterke at daybreak. The strafing performance of a few weeks before was repeated much to the chagrin of the Germans. However, the enemy succeeded in filling the air with machine-gun bullets and anti-aircraft shrapnel. It was not strange that at least one of the attacking planes should be hit in the heavy barrage through which they flew. Fate decreed that Ingalls' plane should be the target for a steel-capped projectile.

A forced landing in enemy territory was imminent. Ingalls afterward said, "My engine cut out, hitting at most on three cylinders. I started on a gentle glide, looked at the gauges and switches, and tried running on the gravity tank, but no luck. So I looked around for a smooth field from an altitude of five hundred feet, and in the midst of Archie bombs."

All seemed lost when suddenly his engine began to pick up and finally pulled him to the safety of a cloud bank through which his companions had disappeared. Forging on through, he found one of his squadron mates who joined up with him. Gleeefully he waved to this friend, and in his delight rocked his little plane from side to side.

To most men, this would have seemed enough excitement and suspense to last for many a long day. But the eventful flight was not yet through. Pursuing a southerly course in a manner suggesting that it had business to attend to, was a Rumpler two-

seater. Ingalls shifted his course on the instant, and with his companion scout following, they hastened to overtake the German and soon found themselves in one of the liveliest of dog-fights.

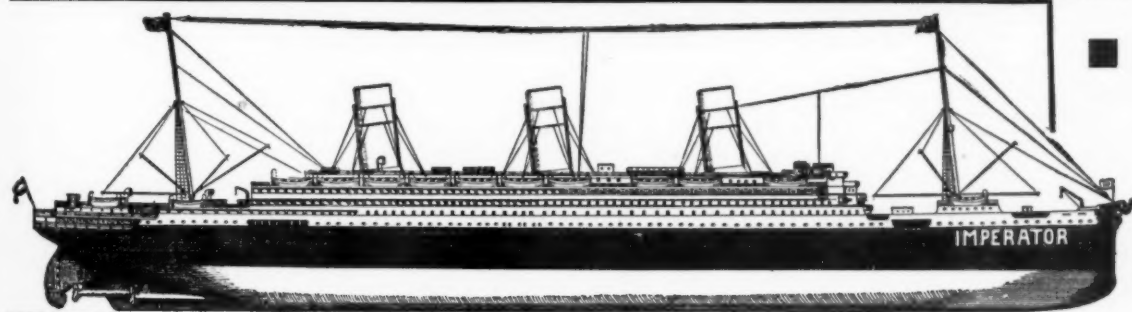
The German was clever and from the first it was evident that the contest would be no easy matter in spite of the fact that the enemy was outnumbered. The Allied single-seaters worked well together, keeping a steady, alternate fire on the Rumpler. But the tricky German, twisting, diving, rolling, managed to elude them for a time while the rear machine gun was a constant menace. However, the shifts of fortune in an air-battle come without warning. Suddenly, the German, nose-down, started diving. Thinking that he had had enough and was attempting to get out of the conflict, the two scouts kept on his tail. But the Rumpler never came out of the dive, crashing on the beach at Ostend. Saluting a brave enemy, Ingalls and his squadron mate at last made their way back to the base.

THREE days later in company with two British pilots, Ingalls attacked an observation balloon near La Barriere. These great bags were generally well protected by a nest of "archies." The feat was not so much to get the balloon as to get it and get away afterward. As the three airmen approached this particular "sausage," the Germans began hauling it in rapidly. The scouts did not falter. It was necessary for

(Continued on page 46)

A New Thrill for Model Builders! Entirely Different!

5-ft. MODEL of a FAMOUS OCEAN LINER ■ Sister Ship of S. S. Leviathan



Lifelike 5-ft. Model of GRAF ZEPPELIN



One of the most beautiful scale models ever designed, and any one can build it. Everything included to the last detail, gondolas, fins, cabin, etc. Metalized parts. In demand for displays, show windows, etc.

150

Prepaid

3-FT. MODEL OF JUNKERS FLYING WING. Complete parts to build this 4-motored plane. A real scale replica; all parts metalized. Start building now for Xmas.

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Do the unusual thing! Build a model of an Ocean Greyhound, the S.S. Imperator (name may be easily changed to S.S. Leviathan), one of the two largest ships afloat! All parts in original color! Model is very lifelike! Parts are laid out in full size, ready to be cut out and reinforced with plywood or cardboard. No detail is omitted! Model has high sales value and may be rented out to stores, movie houses or exhibitions to attract crowds. When complete it is 5 feet long and 16 inches high. Very impressive—exactly like models displayed by Steamship Companies. Work is very fascinating! Your dad will want to help you! No unusual skill required! Start early to have it ready for the Holiday season!

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Price of ship model built complete . . \$75.00 prepaid

The model pictured above built by Herman Lieberman of Norwich, Conn.

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Easy Model Plans 10c Each

Take your choice—each one a Winner! Boeing P-12B, Gee-Bee, Laird Super, Hell Diver, P-6E, Bellanca, Stinson, Lockheed, Grinn, Vega, Traveler, Super Marine, Sopwith Camel, Gloster IV, S.E. 5, Tiger Moth, Spad, Newport, Bernard, Ansaldo, Fokker Triplane, Albatross, Pfalz, Fokker D.V., Polish Fighter. **EACH PLAN 10c—3 FOR 25c, POSTPAID.**

SUPPLIES: Wheels, rubber tired with aluminum disc, 1 1/2" Dia., 20c Pair; 1 1/2" Dia., 25c Pair; 2" Dia., 30c Pair.

BANANA LIQUID, CLEAR DOPE, ACETONE. 2-oz. bottle 10c. Large tube, quick drying Cement 10c. Orders under \$1.00, add 10c packing charge.

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MODEL AIRPLANE NEWS

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1/16 x 2.....2 for 7c
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1 x 2 x 36.....25c
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2 1/2 x 3.....3 for 2c
2 1/2 x 3.....3 for 2c
2 1/2 x 3.....3 for 2c

10" 3/4 x 1 1/2.....2 for 7c
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Formed Propeller Blanks
2c each extra.
Jap Tissue
White, 20x21.....3 for 5c
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Dope, Clear or Colored
1 oz. 5c; 2 oz. 10c
Construct-A-Loid Cement
1 oz. 7c; 2 oz. 12c

Remit by cash or money order. No C.O.D. No stamps. Orders less than \$1.00 not accepted. Add 15c for postage up to \$1.50, for \$1.51 and over 10%. Dealers send for special discount.

CONSTRUCT-A-PLANE CO.
285 Bushwick Ave., Brooklyn, N. Y.

How to get here: 14th St. Subway to Montrose Ave. Station

Here is the Curtiss Hawk P-6E

(Continued from page 26)

them vertically and hollow out. Notice how the landing gear is constructed in cross-section 2. The wheel is placed in a strong wire frame. This wire runs in grooves on the sides of the strut and the ends are bent and set in the wood. Lash this on with thread and glue. When dry, cover with paper to smooth. These struts are set into sockets in the fuselage (cement being placed on them first) before the pants are put on. Being already split, a small portion at the top of the inner half is cut away to slip it on. Part of the wood cut away is reset to fill the notch and the outer half of the shell put in place. When this structure is dry, make the fillets where shown and paint. This type landing gear will stand a lot of rough usage.

All of the struts are made of spruce as it is much stronger than balsa and easier to streamline than bamboo. Make them a little longer than shown in the plans (page 4) and set in small holes as sockets to get a good strong job. They are olive-drab. Make fillets around ends before painting.

Assembly

In joining the lower wings to the fuselage, make heavy pins of bamboo (about 3" long, 3/32" square) and force them through the fuselage, then set the wings onto these and cement. Note dihedral (1 1/2, 3/16") and incidence (-2, trailing edge up 3/32" on upper wing, 1/16" on lower). The wings can be held in place with various objects until dry. The prop is made of spruce and the blades covered with tinfoil, the parts being made separately and cemented. The hub is given a touch of aluminum paint.

Finishing

PIECES of aluminum are bent and forced into the nose to make the air intakes. A narrow strip is bent lengthwise and forced in alongside the exhaust stacks to finish off the opening. The tail wheel is left to your own judgment. A good fork is hard to make and takes a long explanation.

Use heavy thread for the wires.

Advisory Board

(Continued from page 41)

wish to obtain. If you taper the wing in such a manner that the highest point of each one of the various ribs is in a straight line from tip to tip, the effect will be the same as far as stability is concerned, as if your wing were absolutely straight with no sweep-back or sweep-forward. If the rear and trailing edges are tapered to such proportion that, when a line drawn through the high points of the ribs slants backward from the center or wing-root toward the tips, then the effect will be that of a swept-back wing. If there is no taper on the front edge, all of the taper being on the rear or trailing edge, the effect will be that of a swept-forward wing and it will have a tendency to be slightly unstable laterally. I should advise a wing with an equal amount of taper on the leading and trailing edges.

Air-Ways

(Continued from page 23)

know model building will not doubt this for a moment. It is one of the finest models of a Dornier DO-X that we have seen. The builder is Walter H. Reuman of 4012 Fairview Drive, Toledo, Ohio. He tells us that he is 22 years old and hopes that his age will not prevent him from contributing to our columns. Possibly he will be surprised to know that some of our contributors are as old as 50. Model building has ceased to be placed in the class of toys. It is performing the very necessary function of providing young men with inexpensive means of experimentation in aeronautics. The greatest science is involved and for those who have brains, it can be developed to a high degree. This model has a 55" wing span and was built before the real plane was finished in Germany. This is a remarkable stunt in itself. Reuman was fortunate enough to sell this model for \$150.00 to the Thompson Products Company of Cleveland, Ohio. We hope that he will continue to send us information regarding his work.

CLUB NEWS

IVOR FRESHMAN, Secretary of the Model Flying Club of Australia, has again sent us some very interesting information. Australian model builders are becoming more active with each succeeding day. Picture No. 21 shows a group of boys in this club, starting their models into flight. It is quite an impressive display, to say the least. Expert model builders know that it is difficult to get a picture of such a group of planes, all of them flying in a balanced position.

Picture No. 22 shows an Australian Fokker Tri-motor and a Puss Moth.

Picture No. 23 is one of a little ship that flew for 37' 8" and then was lost to sight in the sky. This was designed and built by Ivor Freshman, Secretary of the club. It has a span of 36", a length of 24" and weighs three-quarters of an ounce. We would say that this is "some little ship." It certainly measures up favorably with any of the ships flown by the young men of America.

Mr. Ivor Freshman is shown in Picture No. 24, giving directions to an expert sawyer regarding the sawing of some balsa wood for models. This little shop cuts all of the balsa wood for the Australian model trade.

Some idea of the extent of the model business in this far-off land, from a commercial standpoint, may be had from Picture No. 25. This shows the interior of a thriving model airplane factory. Judging from this scene, it doesn't look as if the depression had hit the model business in this part of the world.

This progressive model club requires that members pass various tests. They are rated in standing and title in the club according to the tests which they are able to pass. A list of these tests follows:

Tests for Members of Branches

No. 1 Cadet Test—Build Glider capable of 80 ft. or 10 secs.

No. 2 Cadet Test—Build Stick Tractor capable of flying 20 secs.

No. 3 Cadet Test—Build Single Pusher capable of flying 20 secs.

(Continued on page 46)

Aerodynamic Design

(Continued from page 38)

perpendicular to the fuselage or body of the airplane. See Fig. No. (41).

The foregoing discussion refers to a wing that has the same length of chord throughout its entire span. If the wing is to be of the tapered type, however, the angle of sweep back should be measured between a line running through the apex of the (V) of the wings and one drawn through the points that are back of the front edge of the wing, a distance of 1/3 the respective chord lengths. Fig No. (42). This figure shows a tapered wing with a 20 degree sweep back on each side.

The most efficient results from a sweep back are obtained when a low center of gravity is used in conjunction with it. We have heretofore assumed that the center of gravity is high, when the line of thrust is very close to the wing center section. This is often, but not always the case. It may be considered low when the center of gravity is a distance of 5/100 of the wing span, below the wing, in the case of swept back wings. An accurate checkup may be made by balancing the ship on its side, shifting the point of support until the point of balance (center of gravity) is found.

If the center of gravity is 5/100 of the wing span below the wing, the required amount of sweep back of the wings is just half of the amount necessary for cases in which the center of gravity is high. For instance, let us suppose that the span of the wing is 25 inches measured from tip to tip. The center of gravity is 1 1/4 inches or 5/100 of the span below the wing. Then the center of gravity is "low." So instead of a twenty degree sweep back on each wing being necessary, only ten degrees is required. (One degree equals a displacement of 1/16 inches in a length of four inches.)

As less sweep back can be used in conjunction with a low center of gravity, the tendency to spin is diminished. This combination is therefore recommended.

Next month we will continue our discussion of lateral stability and show you the method that will give you the best results. (Note:—In the October instalment of this article, we wish to make a correction of one value given in tables No. 1. In the series of tables in which (d) equals 7/8, the value of (13.5), given in column four for 8" diameters, should be (12.5).

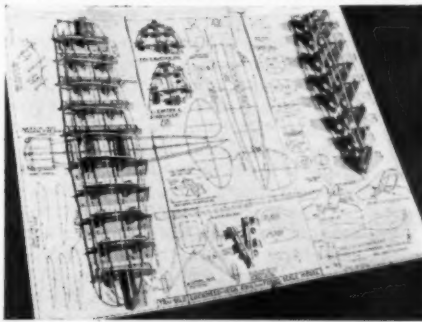
A Miniature Airport

(Continued from page 33)

to work out in detail.

The most exact method might be to place a piece of tracing paper over the picture and trace the plan of the airport on it. After this is done, you will have a distorted figure. This, however, may be readjusted and drawn to suit your convenience. For instance, the right hand line which represents one boundary of the airport will not be at right angles to the boundary which is nearest to your eye. Take a point at the center of this line and swing the line around into proper position. The distortion of course is due to the fact that the camera was not directly above the airport when the picture was taken.

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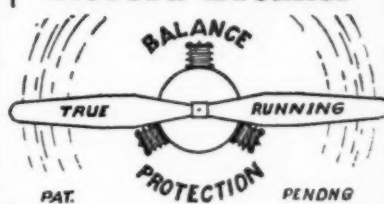
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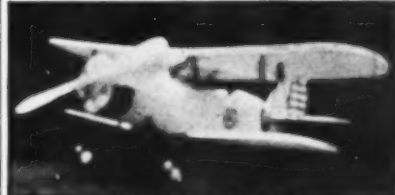
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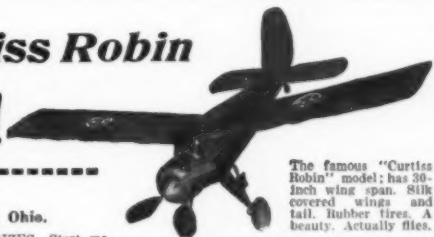
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3/16 x 3/16.....10 for .09	
3/16 x 1/4.....10 for .07	
1/4 x 1/4.....10 for .08	
1/4 x 3/8.....6 for .08	
1/4 x 1/2.....6 for .09	
3/8 x 3/8.....6 for .09	
3/8 x 1/2.....6 for .10	
1/2 x 1/2.....4 for .10	
1 x 1.....2 for .16	

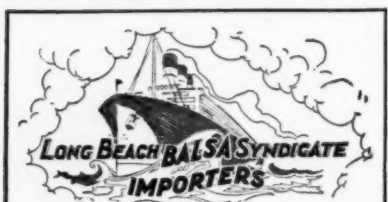
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	1/4 x 2.....2 for .09

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 1 x 6 x 36.....38
 2 x 3 x 36.....42

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Flying the Front

(Continued from page 43)

Ingalls to follow the bag down to five hundred feet before he could get in an effective burst which torched it off in a mass of flames. Indeed, an entire panorama of destruction was soon spread out beneath him, for parts of the flaming balloon had fallen upon two inflated bags moored on the ground and set them afire. The entire observation station was doomed.

There was scant time, however, to even note this complete triumph. The anti-aircraft batteries were still very active. It was impossible for them to miss at the range which Ingalls' daring dive on the balloon had given them. Out of the corner of his eye he saw that the fabric of his wings was ripped and torn. He knew that his fuselage had sustained numerous hits. How about the engine?

He didn't have long to wait for the answer to that question! As he pulled the Camel up in an attempt to gain some altitude, the motor began to miss. Try as he might, he could not gain altitude. By this time his companions had taken separate courses, as agreed on beforehand. Apprehensively, Ingalls listened for the final spluttering that would mean he must land in enemy territory and spend the remainder of the war in a prison camp—providing he didn't crash in, making a landing on the rough terrain of the battle ground.

Apparently his engine wasn't quite ready to give up the game, crippled as it was. Archies, machine guns, rifles, all picked him out as their target. He was traveling so close above the trenches that he could see the startled faces of the men below, who, no doubt, thought he was mad. Luck was with him—extraordinary luck—for he passed through this ordeal of fire, bringing his crippled ship to land at the base.

BY September, the German retreat was well under way. It now fell to the lot of the aviation forces to impede their progress as much as possible. Otherwise, the Allied armies would be unable to keep contact and so capture the infantry when their roads were obstructed. With this in mind, Ingalls took his flight of five Camels on a series of daring raids that covered most of Flanders.

Four trips were required to carry out his plans. Darting here and there, the raiders created havoc. Ammunition dumps were exploded, trains were wrecked. Supply dumps were burned, horse trains scattered beyond hope of assembly.

Nor was this brilliant campaign the finale of Ingalls' work at the front. Before the Armistice was signed, he, with another Camel fighter, was to bring down a two-seated Rumpler over Nieuport. Not content, he took his flight up for a patrol later in the day. Seeing below them a formation of seven Fokkers, the Camels dove down on them. In the ensuing mêlée three Germans were shot down and the rest beat a hasty retreat.

For his brilliant work with Squadron No. 213 Ingalls received the Distinguished Flying Cross from the King of England. It is with pride that Americans may realize that this Naval ace has served the cause of aviation in peacetime no less than in war. Tireless in developing the industry, his record as our flying Assistant Secretary of the Navy for Aviation has been a splendid one.

Air-Ways

(Continued from page 44)

No. 4 Cadet Test—Build Twin Pusher capable of flying 30 secs.

No. 5 Cadet Test—Build Simple Fuselage Type capable of flying 20 secs.

No. 6 Flight Cadet Test—Build Advanced Fuselage capable of flying 40 secs.

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No. 10 "Ace Test"—Original design to R.O.G. and fly over 90 secs., and R.O.W. and fly over 50 secs.

We hope that we will hear more from Mr. Freshman, regarding the model airplane activities in Australia.

Dayton Chapter

DAYTON, Ohio, model builders, who belong to the Dayton Chapter, National Advanced Model Engineers, have put in a very busy summer bringing honors to their club through the setting of new records and by winning the majority of the points in state-wide meets which they have entered.

Here are three real records set by the club during the past month:

On August 20th, William Utzinger of the Third Pursuit Squadron (see story July MODEL AIRPLANE NEWS), set a record with an outdoor fuselage plane, Wakefield specifications, of 14' 7" against the official record of 4' 8". On September 10th, Utzinger with an outdoor fuselage r.o.g., made the exceptional time of 33' 20" before his plane vanished in the clouds.

On the same date, while trying to break the Dayton thread launched glider record of 3' 42" which was held by Harold Coovert of the Hat in the Ring Squadron, James Neff of the Third Pursuit Squadron, using 100 feet of thread and a three-foot glider patterned after a German soaring plane, lost his model in the clouds after 40 minutes, which is believed to be one of the longest model glider flights ever made from a level field. This model was last seen about 10 miles from the starting point.

At the Ohio State Fair, the four Dayton champions who were on a trip to the National Air Races at Akron, carried off the majority of the honors, winning 10 firsts out of 13 events entered, six seconds and two thirds, for a total of 18 ribbons and 11 trophies. In four exhibition events with two planes, a Supermarine S-6 and a Polish P-6, Dayton won six out of eight trophies offered. The Supermarine was built by Edward Woolery (see story August M. A. N.) and the Polish by Harold Coovert.

Robert Houdeshell of Dayton, was the high point winner and made an enviable record, four firsts, two thirds and one fourth out of seven events. Houdeshell won the outdoor fuselage r.o.g.; o.d. flying scale; 9-inch indoor r.o.g.; indoor fuselage. He took fourth in the outdoor scientific, and third in the indoor scientific and indoor flying scale.

Woolery won the indoor scientific, took third in outdoor flying scale, won the boy scout airplane display and took first in exhibition of the non-flying scale.

Harold Coovert of Dayton, took two firsts and two seconds in exhibition classes and was not entered in flying events. Edmund Schieve of Dayton, took two seconds

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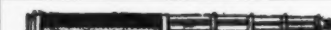
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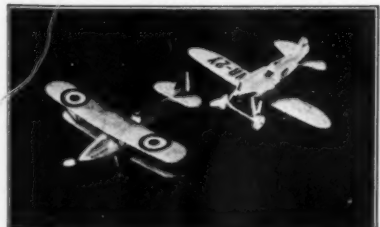


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in flying events, with Utzinger taking one second place.

In the outdoor flying scale event at the Fair Meet, Houdeshell flying a Fokker D-7 made between 900 and 1000 feet distance. In the indoor events, time made was almost 5 minutes despite hanging decorations, a crowd of about 5,000 people and a building as drafty as outdoors, due to the fact that every window and door was open.

About 100 contestants from all parts of Ohio took part in the State Fair Meet.

Youngstown, Ohio, Becomes Air-Minded

WE recently have had a letter from William Beerstein, telling us that a new model airplane club is being organized at the Youngstown Y.M.C.A. He says:

"We are inviting all boys in Youngstown and vicinity who are members of the 'Y' to join. The purpose of our group will be to promote model airplane activity and to study model airplane design so as to produce real record smashing models. The club expects to hold contests regularly, one every four weeks, and members will be given the opportunity to fly their models after each meeting. There will also be competition to determine the standing of the members—the member flying his model longest will be awarded the highest rank, etc. All boys will be required to pass a Baby r.o.g. test of 30 seconds flight before becoming full fledged members.

"We want all Youngstown model builders to turn out. Get any further information at the 'Y' Boys' Division."

Loper Takes It

UNQUESTIONABLY, some of our readers will remember Robert Loper, who has been a contributor to our columns. Mr. L. P. Dittmore of the Topeka, Kansas, Model Airplane Club, sends us the following information about this enterprising young man:

"Scoring 17 out of a possible 20 points, Robert Loper, Topeka, captured the Kiwanis club trophy for all-around excellence for entrants under 21 years old, in the state miniature airplane tournament.

"Loper's planes captured a second in outdoor duration with a flight of 3' 47.4"; third in outdoor gliding with 8.7"; first in indoors duration with 4' 43", and first in indoor fuselage model, with 3' 17.2".

Clifford Mesenhimer, Lawrence, and Elva Jean Dittmore, Topeka, tied for second in the trophy competition with 5 points each. The trophy is a silver airplane mounted on a base of black and silver, with engraved plate.

Model Gossip

THERE were many of our expert model builders who were not fortunate enough to be able to attend the Fifth National Model Airplane Contest held recently at Atlantic City, N. J. One of the outstanding features was the flight of Joe Kovel's indoor model, which won with the time of 13' 3". We thought possibly that some of our readers might be interested in knowing the specifications of Kovel's ship, so here they are:

Wing area: 121 square inches.
Propeller diameter: 15".
Propeller weight: .65 grams.
Slack: 4".

(Continued on page 48)

FREE! 500 Ft. Finest Fresh PARA RUBBER

WITH EVERY \$2.50 ORDER

(Not Including Postage.)

! Finest Quality Merchandise Sold!
on a Money Back Guarantee Basis.

18" Balsa Strips	Bamboo
1/16 x 1/16, .25 for .65	0.45 sq. x 10 1/2" 24 for \$0.75
1/16 x 1/8, .22 for .65	1/16 x 1/4 x 15", each .01
1/16 x 3/16, .20 for .65	1/16 x 1/4 x 15", 12 for .04
1/8 x 1/8, .20 for .65	Clear Dope or Thinner
1/8 x 3/16, .14 for .65	2 ozs. .... .07
1/8 x 1/4, .10 for .65	4 ozs. .... .13
3/16 x 3/16, .10 for .65	Pint, \$.40 Quart, .75
1/4 x 1/4, .8 for .65	Colored Dope
1/2 x 1/2, .3 for .65	White, Red, Blue, Yellow,
1 x 1, .1 for .65	Orange, Olive Drab, Sil-
18" Balsa Planks	ver, Black, Green, \$1.10
1 x 3, .1 for \$1.15	2 ozs. .... .19
2 x 2, .1 for .20	Pint, \$.45 Quart, .69
3 x 3, .1 for .25	Colorless Cement
4 x 4, .1 for .35	Strongest fastest drying on
10" Balsa Sheets	the market. \$1.10
1/32 x 2, .7 for \$1.10	4 ozs. .... .19
1/16 x 2, .7 for .10	Pint, \$.65 Quart, 1.00
1/8 x 2, .5 for .10	
3/16 x 2, .4 for .12	
1/4 x 2, .4 for .13	
For 36" lengths	
double 18" length cost.	Finest Para Rubber
Balsa Prop Blocks	1/32 x 1/32, .5 ft. for \$0.61
5" 9 for \$0.65	225 ft. skein ..... .40
6" 7 for .65	.045 x .3 ft. for .01
7" 3 for .65	.225 ft. skein ..... .60
8" 3 for .65	3/32 flat, .3 ft. for .01
10" 1 for .65	.225 ft. skein ..... .60
12" 1 for .85	1/8 flat, .3 ft. for .01
15" 1 for .97	.225 ft. skein ..... .65
18" 1 for .11	3/16 flat, .2 ft. for .01
Dummy Radial Engines	.225 ft. skein ..... .95
(Celluloid, 8-cylinders)	
1 1/2" diameter \$1.19	Fine Jap Tissue
3" diameter ..... .30	White, Orange, Red, Olive
Straight Music Wire	Drab, Green, Blue, Yellow,
Sizes .014, .020, .028,	Black
.034, 6 ft. \$0.67	Size 20" x 24"
Thrust Bearings (Small)	2 for \$.05—doz. \$2.20
Each \$0.15	Doughnut Rubber Air
Per doz. .... .13	Wheels
Washers	1" dia. Pair, \$1.19
1/4 O. D. Per Doz. \$0.10	1 1/2" dia. Pair, .20
Per Gross ..... .10	1 3/4" dia. Pair, .25
1/4 O. D. Per Doz. \$0.01	Celluloid Wheels
Per Gross ..... .10	1 1/2" dia. Pair, \$0.63
Aluminum Leaf	1 3/4" dia. Pair, .07
.0003 of an inch in	1 1/2" dia. Pair, .10
thickness, 3 1/2" wide, 5 1/2"	1 3/4" dia. Pair, .14
ft. for \$0.03	

HOW TO ORDER

No orders under 50c. Add 15c for packing and postage to orders under \$1.50. Orders over \$1.50 add 10 per cent. When ordering 36" lengths add extra 10c. Canada 10c extra. (Add 10c extra to cover postage on Free Rubber.)

Dealers! Clubs! Write for confidential Wholesale Price List

Universal Model Airplanes

1654 St. Johns Pl., Bklyn., N.Y., Dept. N-11
(Subsidiary of Model Aero Supply Mfg. Co.)

Say "Merry Xmas" with New York Model Kits

Beginners and experienced model builders will welcome these scale models for gifts because of their many wonderful features.

BELLANCA-PACEMAKER

Flying: 18" wing span



Complete Kit

\$1.25 postpaid

FORD TRI-MOTOR TRANSPORT PLANE

Solid Scale Model—14" wing span



Complete Kit

\$2.00 postpaid

COL LINDBERGH'S LOCKHEED SIRIUS

Solid Scale Model 16" wing span



Complete Kit

\$1.70 postpaid

NEW YORK MODEL AIRPLANE CO.

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(Subsidiary of Model Aero Supply Mfg. Co.)

CLASSIFIED DIRECTORY

Advertise in this directory for results. Rate: 10¢ per word. Cash with order. Minimum space, 16 words. January ads. must be in by November 15th.

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Japanese Model Airplane Tissue, 32 colors, also Wood Veneer. Send for samples. See our ad. this paper with Jap. Girl's Face. Whitfield Paper Works, Importers, 12 Vestry Street, New York City.

We manufacture and distribute model airplane supplies exclusively for model concerns. Model Aero Supply Mfg. Co., 1654 St. Johns Place, Brooklyn, N. Y.

12" Flying Twin Pusher Kit, 25¢ postpaid. Canada 35¢. All parts complete with plans and instructions. See our Free Offer on page 47. Universal Model Airplanes, 1526 St. Johns Place, Brooklyn, N. Y.

26" Flying Scale Puss Moth Kit, \$2.50. Crescent Model Aircraft, 1805 Benson Ave., Brooklyn, N. Y.

GIVEN: "Gee Bee Super-Sportster" Model Airplane. Actually flies! Easily earned. Circular FREE. R. P. Langdale, Box 415, Minneapolis, Minn.

Model Building Service. Models custom built from kits. Cleveland Models a specialty. Send stamp for list. Frank T. Roberts, Jamesburg, N. J.

Small scale models expertly made to order. Fine Christmas gifts. William Snow, Box 521, Pawtucket, R. I.

Get our blueprints for building 6" ornamental scale models. Lockheed Vega, Lindbergh Lockheed, Hawk's Travelair, Nominal, Ford Trimotor, Bellanca Airbus, Pacemaker, Condor, Army O-1 and P-6, Boeing Pursuit, Page Racer, Northrop, Great Lakes, Stearman. Price 20¢ each; six for \$1. Popular Model Airplane Co., Box 81, Des Plaines, Ill.

Model Plans for all types in the Junior Polo, 35¢. Get our plan list NOW. Viking Aircraft Co., Box 286, Hamillon, Ohio.

New! Model Airplane Engines, fast, powerful, speedy. For all sizes of Model Airplanes. Runs from 10 to 15 minutes. Write for full information. Washeka, 25 Greenridge Ave., Garden City, New York.

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Unpatented ideas can be sold. I tell you how and help you make the sale. Free particulars (Copyrighted.) Write W. T. Greene, 957 Barrister Bldg., Washington, D. C.

CAMERAS

Watch Camera. "Every Tick a Picture." Complete outfit, \$3.98, postpaid. Send for Bargain List. Thousands of cameras at half price. G. Gennert, Inc., 29 W. 22nd Street, New York City.

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Collection of 61 DIFFERENT \$1.00
AIR MAIL STAMPS

Including Cuba Lindbergh Stamp

L. W. CHARLAT

Leading Dealer in Air Mail Stamps

180 BROADWAY NEW YORK

HAVE YOU DECIDED

what you want for Christmas? The December issue of UNIVERSAL MODEL AIRPLANE NEWS will contain scores of good suggestions in the form of Christmas announcements of models never before on the market. Remember, UNIVERSAL MODEL AIRPLANE NEWS can help to get you the present you want. Show the magazine to your mother and dad and let the advertisements sell them the gift you want.

DON'T

OVERLOOK THESE REAL VALUES

18" Balsa Strips		Para Rubber	
1/16 x 1/16	.25 for .05	.045	.....25 ft. .06
1/16 x 1/8	.22 for .05	1/8 flat	.....25 ft. .07
1/16 x 3/16	.20 for .05	1/16 square	.....25 ft. .08
1/8 x 1/8	.20 for .05	3/16 flat	.....25 ft. .11
1/8 x 1/4	.10 for .05	Thrust Bearings	
18" Sheet and Plank		Small or large	1 doz. .15
1/32 x 2	.....7 for .10	Washers	
1/16 x 2	.....7 for .10	1/4" dia. doz.	0 1/4 gr. .10
1/8 x 2	.....5 for .10	1/2" dia. doz.	0 1/4 gr. .10
3/16 x 2	.....4 for .12	Insania Sheet	
1/4 x 2	.....4 for .15	24 different	.....10
1 x 3	.....1 for .15	Clear Dope—Thinner	
2 x 3	.....1 for .20	2 ozs.	.....07
3 x 3	.....1 for .20	1 ozs.	.....13
4 x 3	.....1 for .22	Pint	.....40
For 36" lengths double 18" length cost.		Colorless Cement	
5" x 1/2 x 1/2	.....7 for .05	2 oz.	.....10
6" x 1/2 x 1/2	.....6 for .05	1 pt.	.....50
7" x 1/2 x 1/2	.....3 for .05	Jap. Tissue	
8" x 1/2 x 1/2	.....3 for .07	2 for .05	
10" x 1/2 x 1/2	.....2 for .07	Colored Jap. Tissue	
Celluloid Parts		red, blue, orange,	
3/8" diam.	.....05	olive drab, Quite	per doz. .20
1" diam.	.....07	Reed and Bamboo	
1 1/2" diam.	.....09	1/16 reed	.....6 ft. .03
1 3/4" diam.	.....13	1/16x1/16x15" Bamboo	12 for .08
2" cyl. motor	.....24	1/16x1/16 Bamboo	12 for .03
1 1/2" cyl. motor	.....11	Plane Wire	
2" cyl. motor	.....20	All sizes	.....5 ft. .02
No orders under 50¢. Add 15¢ for packing and postage to orders under \$1.50. Orders over \$1.50 add 10 per cent. When ordering 36" lengths add extra 10¢. Money Orders Preferred.			

MERCURY MODEL AIRPLANE CO., Dept. 4
4922 Lincoln Place Brooklyn, New York

KNOWLEDGE AND PHILATELY

Stamp collectors enjoy many advantages in the matter of gaining all kinds of useful knowledge without any special effort in that direction. Almost any page selected at random in the stamp album will reveal the names of celebrities in World History, Commerce, Zoology, Aviation Development, and other important facts concerning the various countries of the world.

How many of our readers know that a section of the Panama Canal is known as the "Gaillard Cut." This is shown on a very beautiful set of stamps issued last year for the Canal Zone. The design shows a steamer passing through the Cut and an airplane overhead.

Do you know what are the principal industries of the Columbian Republic? The answer is pictured on a beautiful set of Air Mail stamps which was issued a few weeks ago. The largest industries of this South American Republic are: Cattle, Coffee, Bananas, Oil, Gold, and Emeralds.

Can you name the Lindbergh of Mexico? If not, all you have to do is look up the 1929 Carranza Commemorative issue which has a splendid photograph of Capt. Emilio Carranza, together with his plane "Mexico Excelsior." It also gives the date of his birth and death.

Italy enjoys the distinction of having been the first country to issue an Air Mail stamp. It was issued on May 22, 1917, for an experimental Air Mail flight, between Rome and Turin. This country has shown a very liberal disposition in honoring its poets and artists as well as patriots including Ferrucci, Dante, da Vinci and Garibaldi.

In December, 1930, the Central American Republic of Salvador issued a set of four stamps in honor of Simon Bolivar, the George Washington of South America. Simon Bolivar was responsible for the liberation of Colombia, Venezuela, Bolivar, Ecuador, and Peru and his influence was felt throughout all of South America.

These are just a few facts which occurred to me at the moment but the subject is almost unlimited.

It will astonish you how much you can learn from your stamps.—L. W. Charlat.

Air-Ways

(Continued from page 47)

Winds put into motor: 1400.
Tail boom (overall): 12".
Fin: 4"x4" tapered to 2 1/2".
Sinking rate: .166 meters second.
Wing span: 32 inches.
Propeller block: 15"x1 1-16"x1 5-8".
Motor: 1-8"-30 special rubber.
Weight: 2.3 grams.
Winds ship came down with: 30.
Stabilizer span: 12".
Total weight of ship: 6.3 grams.
Gliding angle: 10 plus.

Carl Goldberg, official world's record holder, won third place in the Atlantic City contest, with the time of 12' 38". Carl has done over 14 minutes with this ship but he ran into a little misfortune as the ceiling was fairly low and his ship was designed to take advantage of a high ceiling.

Among the new developments on indoor ships, Carl Goldberg's "tear drop" motor stick "takes the cake." It is a hollowed tapered stick with no bulkheads and only one seam. Its cross-section resembles a streamline or tear drop shape. Here's the way it can be made.

First select a clear light piece of 1-32" flat balsa. Sand a 1"x16" strip of it uniformly down to .025". Taper strip from 5-8" at ends to 7-8" at center. Sand ends down to about .022". Now round two of the edges of a piece of balsa 1-8"x1-4"x17" so that its cross-section is a "U" instead of being rectangular. Soak original strip in very hot water, then bend around "U" beam. Wrap with gauze and put on stove. Heat very carefully until absolutely dry. This will take about 15 minutes. Turn the wood over occasionally. When dry take out and cement seams together. Sand smooth, put in small end plugs, and there you are. A honey of a motor stick.

JEROME KITTEL.

CORRESPONDENTS WANTED

ROBERT OGDEN of 6317-19 Drexel Avenue, Chicago, Illinois, would like to join an organized model club. Will not some enterprising club secretary communicate with him?

If you live in the north central states and want to start a model airplane club, write to one who has done it. Write to Irvine Seath of 5522 France Avenue South, Minneapolis, Minn., and get some good tried and true information. (Editor's note: The editor will be very pleased to know exactly what this information is. Will not Irvine Seath write to Mr. Grant and give him an outline of the formation of a model club. It will be very useful, as calls come for this information continuously.)

James Fairley of 2633 York Street, Vancouver, B. C., Canada, would like short new items that could be used as material for the Vancouver Sun newspaper. He is taking care of the model department and is sadly in need of material, which many of our readers might be interested in contributing to him.

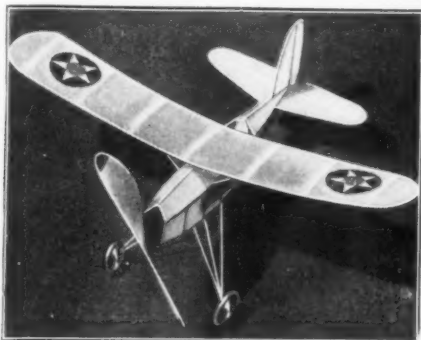
If there is anybody anywhere interested in forming a model airplane club, kindly communicate with Bill O'Keefe of 956 North 21st Street, Milwaukee, Wisconsin.

My Planes Fly Boys!

The Comet Kid

"Your Company Can't be Beat for Service, nor YOUR MODELS for TRUE FLYERS!"

Lloyd Gabriel (Mich.)



Comet's Dipper—Span: 12½"—Length: 9½"

"My DIPPER FLEW 900 Feet!"

Thousands like Bob Latas of Colorado have easily, quickly built and FLOWN Dipper hundreds of feet. You can, too. The price is amazingly low—50¢ postpaid—results amazingly great. Weighs less than one-half oz., rises off ground, flies like a bird. Colors: Pure white, blue and red. Complete materials come to you neatly packed in yellow and black box. MATERIALS include rubber motor, balsa prop block, all wire parts, Jap tie-rod, cement, banana oil, wheels, all balsa parts, banties, clear instructions, FULL SIZE, 3-view PLANS, etc. Get yours quick. Have big fun—order C. O. D.!

50¢

Postpaid or at DEALERS!

Span: 13"
Length: 14"

FLYING Scale

\$1.50

POSTPAID or at Dealers!

NEW U. S. A. NAVY RACER

Striking thru the air, its red, white and blue colors glistening in the sun, this flying scale U. S. Navy Racer, crafted by Comet—will thrill any fellow in any country! Unusually easy to build! Hand-launched for land flights, or will rise off water. Bargain price of only \$1.50 brings you this "navy's pride" in complete kit from INSIDE "Our Flag" silvered box, colored red, white, blue. Get hot on this, gang! Remember, Comet Planes FLY! Order quick, using coupon—send no money—use easy C.O.D. plan!

SATISFACTION GUARANTEED OR MONEY REFUNDED

Order with perfect confidence as thousands have done under this fair and square guarantee: Satisfaction, or Replacement, or Money Back. Means just what it says. Comet kits give such 100% satisfaction everyone is delighted. You will be, too! If you prefer to order direct from us, send cash by money order or registered mail. Add 10¢ for exchange, if you send check. We pay postage on CASH orders. For convenience, use our "Send no money" C.O.D. method of ordering. Just send coupon and pay for Kits and few pennies postage. C.O.D. fee, on delivery. Canadians add 20¢ to remittance. Use international money order, no Canadian coins added.

COMET'S New 5-Color, 24-Page CATALOG Shows ALL PLANES in FULL COLORS!

The only one of its kind in the world! Different! Unique! Beautiful! Shows actual planes built by boys from Comet Kits, in their full, complete, rich colors! Comet supplies described, illustrated! Get your copy quick—LIMITED SUPPLY PRINTED! NEW Customers get Catalog FREE with first order. Otherwise, send 3¢ stamp for mailing cost. Easily worth 25¢. Get YOUR COPY quick—sensational! FIRST and only one of its kind! You'll say "Comet leads again!" when you see this BIG SURPRISE CATALOG!

3¢ Stamp

BIG NEWS! 3 NEW Comet KITS IN FULL COLORS

Printed on Back of This Page!

Follow the leader—follow Comet! FIRST to print ALL PLANES in FULL COLORS in our new, amazing, 24-page, 5-color CATALOG (Have you seen it? OH, MAN!)—and FIRST to show model airplanes in their real, complete colors on this back page of Model Airplane News! Now, read this page FIRST! Read how you can get 10 Pairs of Comet INSIGNIA FREE! by ordering Comet Kits through your local store . . . THEN read, see, 3-color Photos of new Comet Kits on reverse side of this page! Go to it—then ORDER! QUICK! You can order C.O.D.! We want you to!

Bates, Jr., "Formed" Celluloid Prop Free with each \$1 and \$1.50 Comet kit. Offer good limited time so act quick! Super-pull gives longer flights! Invented by third man ever to FLY in U. S.: Wright was first, then Curtiss—then Carl Bates!

AMAZING New INVENTION FREE!

Another Great FLYER!



Comet's NEW RED RACER!

Span: 15½"
Length: 11½"

You should see and fly this red-hot baby! "Speed" all over it. All-red color, gleaming black celluloid wheels. Easy to build—and only costs \$1.00 postpaid! Special Comet insignia. Big, brilliantly colored box containing EVERYTHING needed to quickly, easily build and fly this original COMET CRAFT! Full-size, 3-view plans, of course! Get it! Order, using Coupon now! Satisfaction Guaranteed. Hurry! You can order C.O.D. from Comet!

\$1 POSTPAID or at DEALERS!

10 PAIR INSIGNIA FREE!



If you will help us get a dealer in your locality, we will give you 10 Pairs of Comet Insignia. HERE'S HOW YOU GET THE FREE INSIGNIA: Order the Comet kits you want from this page and Comet kits on back of this page. Fill out other side of this coupon, then take coupon to your favorite school supply, hardware, department or drug store and ask them to order kits for you. Then we enclose 10 pair of these Insignia with your order: Indian Head, Skull, Kicking Mule, Cat, Hat'n Ring, Wolf-head, Dog (see picture above), Capitol Dome, The Executioner. They're great! Get yours free by ordering thru a dealer! Hurry! See Comet Planes in FULL COLOR on back page now!

Order Now on BACK Side of Coupon — Take To Dealer or Mail It Direct To Comet!

DEALERS! Hardware, Department, School Supply, Variety or Drug Stores—Read This!

Accept this coupon, correctly filled in, from customers who ask you to order kits for them. We will include in their order 10 Pair Insignia Free! Cooperate, help them get Free Insignia! YOU DO THIS: Collect price of kits ordered from customer, send amount to us with this Coupon. We will then ship kits to you prepaid. We will not accept C.O.D. orders from you for your customers—just cash orders.

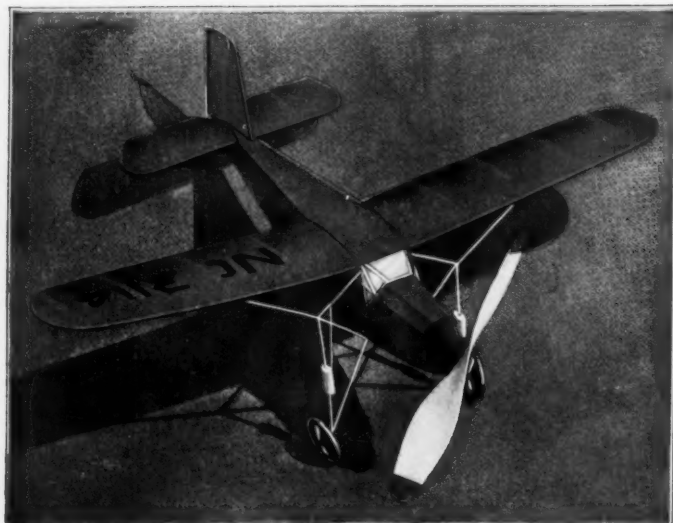
We Mail You Our Check, Mr. Dealer, as Commission Which is YOUR Dealer's Discount!

GREATEST DEALER LINE IN U. S. A.!

WRITE at once for full details of our Special Introductory Dealer's Offer. It lets you stock and SELL Comet kits without risking one cent of your money! Get next to this "No-Risk," GUARANTEED Trial Sales Offer quick!

COMET KITS PRICED TO SELL!

Priced to retail from 50¢ to \$1.50. BIG advertising schedule in 12 national magazines helps you sell. Kits packed in handsome, "sell-on-sight" boxes! Unusual, sales-creating Dealer Helps given! Kits give 100% FLYING Satisfaction to customers. Builds BIG REPEAT business! Great "leader" to draw men, boy trade. ALL KITS SOLD ON MONEY BACK GUARANTEE. Investigate now! Hundreds of Comet dealers making easy, effortless, steady, year-round profits in these times! You can. WRITE TODAY! Get in on Big Xmas Sales Profits!



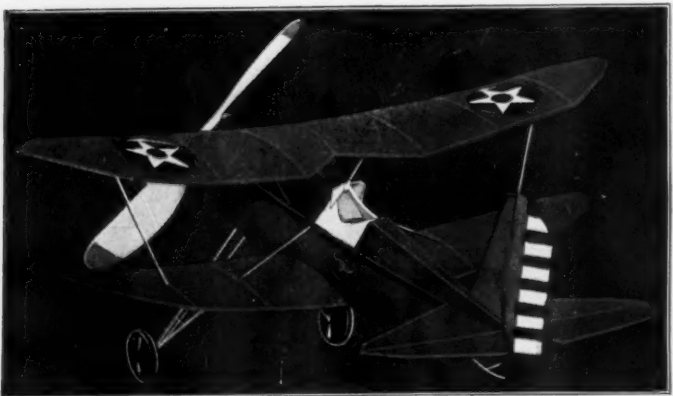
Curtiss Robin—Span: 17½", Length: 14"

NEW ARMY PURSUIT FLIES 1300 Feet!

75¢

Postpaid
or at
Dealers

"Your Army C-1-Pursuit made a RECORD Flight for me of 1300 FEET! It was the easiest ship I ever constructed. The plans so easy to follow!" Clyde Kowalka (Ohio), PROOF that we mean what we say about marvelous **FLYABILITY** of ALL Comet planes! Look at that color-photo of the NEW ARMY PURSUIT! Then enjoy building, flying this trim, fierce U. S. Army fighter—our own **FLYING** design! COMPLETE kit with ALL materials, FULL-SIZE plans, etc., complete in yellow-black box only 75¢ postpaid! See view of Pursuit box and kit contents at right! Then Order! We allow you to order C.O.D.! Send no money—mail the coupon!



C-1-Pursuit—Span: 15", Length: 12¼"

SEE OTHER SIDE of THIS PAGE Before You Order — THEN Order Kits On This Yellow Coupon-Side — HURRY!

Send no money—we trust you! Just order C.O.D., just send coupon! Or send money order and we pay postage. If you send check, add 15¢ extra for exchange. CANADIANS: Send 20% extra. Use international money order—ask your postman! Order quick—build these planes that FLY—like thousands are doing!

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NEW 5-Color
Catalog Free**

Shows ALL Comet planes in FULL COLORS! Hot off press! Supplies illustrated. Unique! "Different!" No other like it! Revolutionary! LIMITED SUPPLY PRINTED so get quick! Worth 25¢. Free With Order, otherwise send 3¢ in stamps. Don't buy any Kit out Comet's, till you've seen this amazing, color catalog! It will surprise amaze you! Hurry!

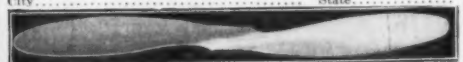
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FREE Insignia Offer!**

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CASH () I enclose \$ for kits I am checking. Comet pays postage! Comet guarantees satisfaction! Check Articles You Want:
() Curtiss Robin () Baby Bullet () The Zipp () Dipper
() C-1-Pursuit () U.S. Navy Racer () Red Racer () Catalog (5¢)
New States Jr. Celluloid Props: Size _____ No. _____ Color _____
(PRINT CLEARLY)

Name _____ Street _____
City _____ State _____



FREE! Strange NEW Celluloid Propeller INVENTION Banishes "Prop" Carving—FREE with each \$1 and \$1.50 kit! Super-pulling, realistic, already formed State Celluloid Propeller is sensational! Gives BETTER Flight—outlasts plane! Eliminates propeller carving job! (See photo.) Free with shaft (in addition to regular blades prop blank) on \$1 and \$1.50 kits. Prices ordered separate: 5", 6", 7", 8" and 9", 10¢ each. Colors: Red, green, yellow, black white. Order quick!

**ALL Planes Reproduced in
FULL COLORS—Build, FLY 'em!**

NEW! Curtiss Robin FLYING Scale

"Flies 5 Times As Far As My
Dipper!" writes Harry Magni of N.Y.

Gosh! Isn't this new FLYING Scale Curtiss Robin cabin simply beautiful! FLIES 1500 feet—is dead easy to build—and costs you only \$1 postpaid! Looks SWELL and FLIES swell—like all Comet-crafted models! A COMPLETE kit of ALL materials needed with FULL-SIZE, 3-view plans sent you inside brightly colored cardboard box with new FREE and EXTRA Celluloid formed Prop! Only \$1 postpaid! Order quick! Send coupon—send no money!

\$1 POSTPAID
or
at DEALERS



FLYING
Scale

Span: 14½"
Length: 11"

NEW! Heath Baby Bullet!

What a ship! Here's the FIRST FLYING Scale of Heath Baby Bullet ever offered you—and sells at bargain price of \$1 postpaid! Swift as a flash in flight—sweet as a dream in sight! And EASY to build as ALL Comet-craft! A remarkable value with COMPLETE Kit containing ALL materials, FULL-SIZE, 3-view plans, etc., in big, 2-color box—\$1 postpaid! Think of it. Look at it. FLY IT! Order—use the convenient "send no money" C.O.D. coupon! Comet trusts you!

\$1 POST-PAID
or at Dealers

Actual color photo (right) shows beautiful yellow-black box in which you will receive your new Army C-1-Pursuit! View also shows partial contents of Kit. Boys, Comet packs ALL kits neatly in beautiful color boxes because we know you appreciate the EXTRA value. Costs us more, but gives YOU more satisfaction. Just another example of Comet's progressive leadership in giving you the most and best at lower cost! Hurry—order now on coupon!



Span: 15½"
Length: 10¼"

75¢
POSTPAID
or at Dealers

NEW! The Z-I-P-P

**FLIES
1,000 Feet**

to FLY! Be first to give your friends a thrill with The Zipp, COMPLETE Kit in 2-color, sturdy box with ALL materials, FULL-SIZE, 3-view plans, etc., only 75¢ postpaid! Hurry, Order! Use Coupon! We trust you—just order C. O. D.

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